HELSINKI UNIVERSITY OF TECHNOLOGY
Department of Industrial Engineering and Management
Laboratory of Work Psychology and Leadership

KARI YLIHÄRSILÄ

DESIGNING PRACTICES FOR MAKING USE OF TACIT KNOWLEDGE IN A KNOWLEDGE WORK ENVIRONMENT

Thesis submitted in partial fulfilment of the requirements
for the degree of Master of Science in Engineering.

Espoo, 21.08.2007

Supervisor: Professor Matti Vartiainen
Instructor: M. Pol.Sc. Kari Hakola

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ABSTRACT OF THE MASTER'S THESIS

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This thesis deals with making use of tacit knowledge in a knowledge work environment. Purpose of this research is to design practices, tools and ways of working for making use of tacit knowledge in a knowledge intensive corporation. Making use of tacit knowledge was researched in the areas of new employee introduction, using electronic workspaces and working with virtual teams.

The practices were designed using a constructive research approach. 30 persons were interviewed within the study. The research questions are the following: 1) What is tacit knowledge? 2) What are best practices for making use of tacit knowledge in a knowledge work environment? 3) What are key issues to be taken into account when introducing these practices in a knowledge work corporation?

In the literature study part tacit knowledge is defined and ways of sharing tacit knowledge are identified. Introducing practices for making use of tacit knowledge inside organizations are also examined. In the empirical part best practices were gathered from the organization, which were refined through theoretical understandings. Different maturity levels were reached in each area of research. Some of these are presented as tools to use and some as conceptual understandings.

Concrete tools for transferring tacit knowledge in new employee introduction were designed. These were tested unofficially and have reached a level of maturity ready for pilot-testing. These tools deal mainly with making use of implicit knowledge, which the part of tacit knowledge that can be put into words.

In the areas of electronic workspaces and virtual teams the results are presented as conceptual understandings. In addition to understanding and methods, making use of tacit knowledge was found to be mostly about enabling the employees' intrinsic motivation for sharing their knowledge. This can occur for example through stories, comments and concept creation. A model was empirically verified consisting of cultural, intentional, systemic and behavioural perspectives on motivation for knowledge sharing.

KEYWORDS: tacit knowledge, employee introduction, electronic workspaces, virtual teams, know-how, transfer of know-how, modelling	**PUBLISHING LANGUAGE:** English

TEKNILLINEN KORKEAKOULU DIPLOMITYÖN TIIVISTELMÄ

Tuotantotalouden osasto

<table>
<tr><td colspan="3">TEKIJÄ: Kari Ylihärsilä</td></tr>
<tr><td colspan="3">TYÖN NIMI: Käytäntöjen suunnitteleminen hiljaisen tiedon hyödyntämiseksi tietotyöympäristössä.</td></tr>
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<tr><td colspan="3">TYÖN OHJAAJA: Valt. Kand. Kari Hakola</td></tr>
<tr><td colspan="3">Tämä diplomityö käsittelee hiljaisen tiedon hyödyntämistä tietotyöympäristössä. Tutkimuksen tarkoituksena on luoda käytäntöjä, työkaluja ja toimintatapoja hiljaisen tiedon hyödyntämiseksi tietointensiivisessä yrityksessä. Hiljaisen tiedon hyödyntämistä tutkittiin seuraavilla alueilla: Uusien työntekijöiden perehdyttäminen, sähköisten työtilojen käyttäminen ja toimiminen virtuaalitiimeissä.

Käytäntöjä luotiin konstruktiivisella tutkimusotteella. Tutkimuksen puitteissa haastateltiin yhteensä 30 henkilöä. Tutkimuskysymykset olivat seuraavat: 1) Mitä on hiljainen tieto? 2) Mitkä ovat parhaat käytännöt hiljaisen tiedon hyödyntämiseksi tietotyöympäristössä? 3) Mitä tekijöitä tulee erityisesti huomioida tuotaessa näitä käytäntöjä yrityksen sisällä käyttöön?

Kirjallisuuskatsauksessa määritellään hiljainen tieto ja tunnistetaan tapoja sen jakamiseksi. Samalla etsitään tekijöitä, joita tulee huomioida tuotaessa käytäntöjä hiljaisen tiedon hyödyntämiseksi käyttöön organisaatioissa. Kokeellisessa osuudessa kerättiin senhetkisiä parhaita käytäntöjä kohdeorganisaation sisältä ja niitä jatkojalostettiin teoreettisten ymmärrysten avulla. Kullakin tutkimusalueella päästiin käytäntöjen luomisessa eri kypsyystasolle. Jotkin käytännöistä esitellään hyödynnettävissä olevina työkaluina ja toiset esitellään käsitteellisellä tasolla.

Uusien työntekijöiden perehdyttämisalueella suunniteltiin pilotointivalmiit työkalut hiljaisen tiedon siirtämiseksi, joita kokeiltiin epävirallisesti. Työkalut hyödyntävät pääasiassa implisiittista tietoa, joka on se osa hiljaista tietoa joka voidaan ilmaista sanoin.

Sähköisten työtilojen sekä virtuaalitiimien alueilla tulokset esitellään käsitteellisellä tasolla. Hiljaisen tiedon hyödyntämisessä huomattiin olevan kyse ymmärryksen ja menetelmien lisäksi pääasiassa työntekijöiden sisälähtöisen motivaation synnyttämisestä hiljaisen tietonsa jakamiseksi. Jakamistapoja ovat esimerkiksi tarinoiden kertominen, kommenttien jakaminen ja konseptien luominen. Eräs kulttuurillisista, aikomuksellisista, systeemisistä ja käytöksellisistä näkökulmista koostuva malli todennettiin empiirisesti tutkittaessa tiedonjakamishalukkuuteen vaikuttavia tekijöitä.</td></tr>
<tr><td colspan="2">AVAINSANAT: hiljainen tieto, perehdytys, sähköiset työtilat, virtuaalitiimi, osaaminen, osaamisen siirto, mallintaminen</td><td>JULKAISUKIELI:
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Foreword

Tacit knowledge to me is a very interesting topic, and also rather difficult to write about. I have found much of my work to have been defining the practical steps for my work from conceptual guidelines, explicating concepts and negotiating common meanings.

I want to thank Tatu Kuivalahti, Jorma Lehtinen and Kari Hakola at TietoEnator Digital Innovations for providing valuable instruction for this work, and for helping me with the ambiguity around the subject. I want to thank Professor Matti Vartiainen for his help while supervising this work and for helping me build a thesis out of these efforts. Thanks to the student group who performed external interviews: Aleksi Autere, Jani Alanko, Juha Kulomäki and Juhana Peltonen.

There are many other people who have provided valuable help along this journey: from TietoEnator I would like to thank Silja Lindqvist, Niku Yliluoma, Janne Lohvansuu, Jyrki Miettinen, Ilkka Schulman, Bo Harald and Eila Pohjola especially. I want to acknowledge Anssi Balk for making me familiar with the integral framework and Tommi Ryyppö for his thesis providing many insights on presenting a complex and ambiguous subject matter like tacit knowledge scientifically.

There are naturally many others, especially friends and family. Thank you all.

Espoo, 21 August 2007

Kari Ylihärsilä

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1 Introduction

This section presents the research questions, background for the study and three specific research areas for answering the research questions.

1.1 Background and purpose of the study

Knowledge has become a very important distinguishing factor for competitive advantage in the information and knowledge worker age. Deep professional know-how is a basic requirement for the success of an expert organization. Much of such know-how, like the skill of delivering a good customer presentation, is based on tacit knowledge around the subject.

A great deal of literature on knowledge management actually focuses on "information management" [Nonaka et Al., 2000], and seems to understand knowledge mainly as explicit information stored in various types of documents. This leaves out the personal skills, mindsets and "gut feelings" essential for doing anything, that draw upon each person's personal experience.

The purpose of the work that this thesis describes was to design tools, practices and ways of working for using tacit knowledge in a knowledge-intensive company. Combining expertise and knowledge from different fields is where the highest added value is created and where the languages people speak and understandings they have (both culturally and professionally) the most differ from each other. This thesis describes the process of designing these practices and also presents the results.

As the phenomenon of professional know-how is multi-faceted, dealing with it in corporations requires solutions for multiple situations and environments. This is why both physical, as well as virtual means have been chosen to be studied. This study takes a tacit knowledge perspective on introducing new employees, on working with virtual teams and on sharing knowledge through electronic workspaces.

The very first step has been recognizing knowledge as not merely something that is written and filed, but also as the skills, personal understandings and capabilities to do the things that knowledge work requires. These include for example maintaining networks, working on concepts and negotiating meaning [Efimova, 2004]. It has been said that knowledge workers are the craftsmen and –women of our times [McGee, 2004].

While the subject of tacit knowledge can be seen as complex and difficult to see clearly, there is a need for practices that are simple and effective. The more complex the subject at hand, the clearer and more well-defined leadership it requires. The content of tacit knowledge each individual holds seems impossible to be led, however, practices that people use to share and make use of their knowledge can be influenced. Such practices can then be implemented within an organization.

Practices for sharing and making use of using tacit knowledge can be applied more universally than tacit understandings of selected experts (after they have been made visible). This is why this study focuses on designing practices instead of being a knowledge explication project. In other words more focus of this study is on designing practices for using and sharing tacit knowledge, than is on documenting tacit understandings of currently best-performing workers and making the documented information more accessible to others.

1.2 Research questions

The research questions of this study are as follows:

1. What is tacit knowledge?
2. What are best practices for making use of tacit knowledge in a knowledge work environment?
    - Inside an organization
    - locally as well as across borders
    - in combining different expertises
    - in different physical, social and virtual contexts
3. What are key issues to be taken into account when introducing these practices in a knowledge work corporation?

First, tacit knowledge was examined and defined. Differences and similarities to other forms of knowledge are examined through literature, so the nature and value of tacit knowledge can be explored.

Second, this study focused on designing practices for making use of tacit knowledge in a knowledge work environment, with the above constraints. This was to provide insight on the “how” to make use of tacit knowledge to one’s

advantage in addition to the "what" it is. Designing practices was examined in three research areas, which are presented in the following chapter.

Third, key issues were examined that are relevant to introducing these practices in a knowledge work corporation.

1.3 Areas of research

Since knowledge work and the modern knowledge work environment have many aspects, the transfer and use of tacit knowledge was approached here from several angles. The following areas were chosen to be researched:

New employee introduction

When a new employee is recruited it can take a substantial amount of time before he learns to perform work as productively as his colleagues. Much of employee introduction seems to be administrative and the information seems to rely heavily of predefined presentations.

Is this area, we take a look at how this time can be shortened and enriched by bringing tacit knowledge to employee introduction. The tacit side of learning work that was examined includes learning about the mindset, the organizational culture and how things really work at the employee's level of operations.

Making use of tacit knowledge in virtual teams

Virtual teams are becoming an increasingly popular way of working. This is true especially in international organizations where team members are put together from different countries, based on their expertise.

This way of working presents challenges to the transfer of knowledge. Especially the "casual" and face-to-face interactions, which promote informal knowledge sharing, are greatly reduced as compared to co-located teams. In this area, we take a look at virtual teams from the tacit knowledge -sharing perspective.

Utilizing Electronic workspaces in sharing tacit knowledge

Electronic workspaces and collaboration tools are becoming more and more used in organizations. The electronic workspace has a high bias towards text, which means most of the knowledge stored in electronic workspaces has to be first made explicit. One of the key questions during the study became how to create a natural desire to collaborate and share one's personal knowledge online by having appropriate structures in virtual workspaces.

The following two areas were also of interest. However, 90% of the research focused on the above three areas. This thesis describes the work done for the main three areas defined above.

1) Workplace arrangements supporting sharing of knowledge. The way the workplace environment is organized has an influence on how frequently and in what ways people interact with each other. A key question here was how to manage the logistics of interaction flows between people in a way that most supports making use of (tacit) knowledge that is relevant to the business. *2) Finding the right people and information in real-time*. One of the organizational needs that became apparent was how to find the right people and knowledge when you need them. It's often more useful to find a person who knows something than to find information about the subject itself, especially if you need knowledge on people or an organization. Personal contacts between all employees are not really possible in a large international organization. A technical approach to this problem was suggested in this area.

1.4 Scope

Both physical (face-to-face) as well as virtual means of sharing tacit knowledge are examined. This study does not include extensive testing of generated concepts and applications. The practices designed for new employee introduction have been piloted in a knowledge work environment, but the effect of these practices has not been thoroughly tested in knowledge work corporations.

The maturity reached in research varies between the areas. As such, this thesis has more to do with designing practices for using tacit knowledge in a knowledge work environment than with presenting practices itself. An exception to this is the area of introducing new employees, where concrete tools are offered for transferring implicit knowledge to new employees.

1.5 Structure of the thesis

This thesis consists of eight chapters, which are briefly described below. What follows are four theoretical chapters, after which research methods are presented. The two last chapters present and discuss the study's empirical results.

Chapter two provides a theoretical understanding of knowledge. In this chapter, tacit knowledge is identified and it is placed into a broader context of knowledge.

Chapter three examines knowledge work from a theoretical perspective and discusses the role of tacit knowledge in knowledge work. Several core processes of performing knowledge work are identified.

Chapter four discusses knowledge creation taking place in interactions between explicit and tacit knowledge. Necessary conditions as well as specific methods for sharing of tacit knowledge are discussed.

Chapter five theoretically examines the research areas of employee introduction, electronic workspaces and virtual teams. Efforts to connect the areas to understandings about tacit knowledge from the previous chapters are made in this section.

Chapter six presents the research methods used in this study and describes the research environment. This chapter also describes the implementation of the study.

Chapter seven presents empirical results for each of the research areas.

Chapter eight discusses the empirical results in light of the literature review of the first chapters. This chapter concludes the thesis and also presents an evaluation of research methods with suggestions for further research.

2 What is knowledge

This section explores knowledge to provide an understanding where tacit knowledge fits in into the whole context of knowledge. Here, knowledge will be explored from several different perspectives. These were used during the empirical research to illustrate this study and to place the tools and ideas developed into context.

2.1 Explicit, implicit and tacit knowledge

According to the philosopher Michael Polanyi as referenced by [Toivonen & Asikainen, 2004], there are three levels to knowledge:

1. Knowledge we can articulate *(Explicit knowledge)*
2. Knowledge that is not yet articulated, that we can bring to our attention. *(Implicit knowledge, which is also a form of tacit knowledge)*
3. Knowledge that for some reason we cannot articulate or bring to our attention. *(Tacit knowledge)*

These are also presented by [Koskinen, 2001]. Figure 1 summarizes and illustrates these levels of knowledge.

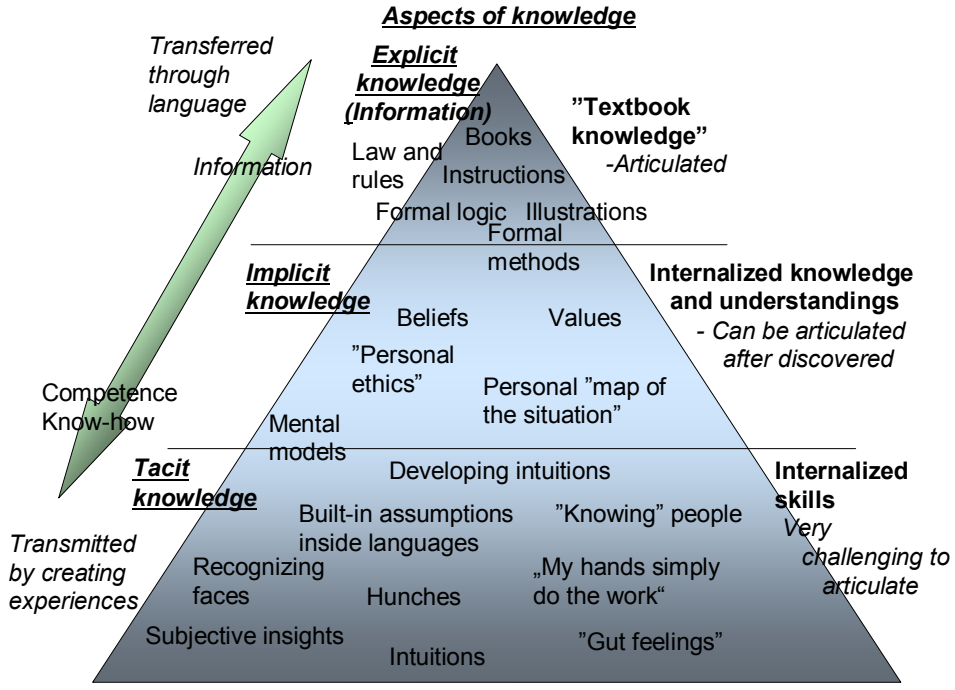

Figure 1"Knowledge iceberg" - a graphical representation combining depth and aspects of knowledge.

Explicit knowledge is knowledge that has been articulated. It has been recognized and it's often in the form of text and words, step-by-step instructions, and illustrations. Explicit knowledge is "formal and systematic" [Nonaka et Al., 1995]. This is also, what in western societies generally is thought of as "knowledge" [Nonaka et Al., 2000]. In this study, explicit knowledge is considered information.

Implicit knowledge remains implicit because it has not been articulated (or "surfaced"). Converting implicit knowledge to explicit knowledge can be done by asking the right questions. For example: What do you feel is the larger purpose which our teams take part in? Or, what is important to you about doing your work well? The latter question will bring out values, which often remain implicit. Implicit means operational knowledge which the individual has not articulated and is not aware of.

Tacit knowledge can be described as deep know-how accumulated through experience. This know-how is often unconscious, and difficult to put into words. A phrase that describes tacit knowledge well would be a metal worker making a machine part saying "I don't really know how I do it, my hands simply do the work" [Nerkki-Saarinen, 2006]. Knowledge at the tacit level manifests through skills and intuitions about a situation. The know-how is operating without requiring conscious attention, like upholding the balance while walking, recognizing emotions or combining the skills needed for driving a car. It is by nature intuitive and develops through gathering experiences.

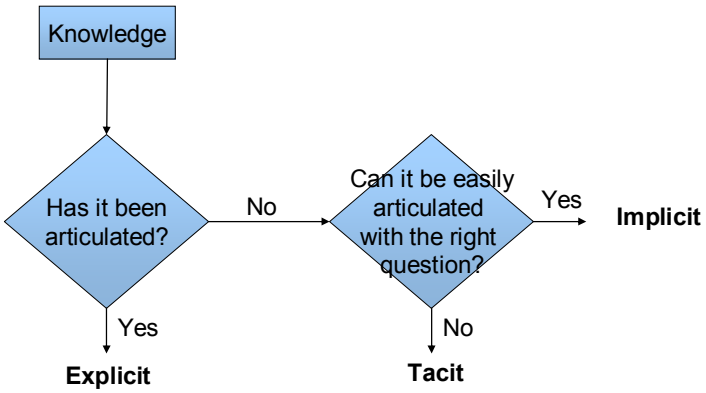

Figure 2 Structure of knowledge – adapted from Koskinen [Koskinen, K. 2001], 18. Finding out to which category of knowledge something belongs.

There are aspects of knowledge where it is unclear whether they are tacit or explicit, such as the tone of voice information is delivered with. While this categorization can be useful, it is also a generalization. All aspects are needed and work together. For example, written speech is possible only after internal speech is well-developed [Nonaka et Al., 2000]. There are sides that are tacit, explicit and explicit to any knowing and experience. Also, implicit knowledge is considered a part of tacit knowledge in this study. The purpose here is to create a useful map for making sense of the tacit knowledge phenomenon, and maps do contain generalizations.

2.2 Information and knowledge

Röll (Röll, 2004) considers information and knowledge to be separate entities. Knowledge is considered as a process ("knowing") and information is considered as a thing. According to Röll, "knowledge is always bound to human beings and impossible to digitalize. Once it is 'explicated', it becomes information."

Table 1 Information and knowledge according to [Röll, 2004].

Information	*Knowledge*
-Static	*-Dynamic*
-Independent of the individual	*-Dependent on individuals*
-Explicit	*-Tacit*
-Digital	*-Analogue*
-Easy to duplicate	*-Must be re-created*
-Easy to broadcast	*-Face-to-face mainly*
-No intrinsic meaning	*-Meaning has to be personally assigned*

This categorization fits in well with the explicit and implicit/tacit sides of knowledge. Once implicit knowledge is written down it becomes information, the meaning of which a person reading it has to re-create. This information can be valuable however, because as implicit the piece of knowledge probably hasn't been articulated before. Articulating it helps others be able to internalize or understand that piece of knowledge.

According to [Holma et al., 1997] as referenced by [Koskinen, 2001] knowledge can be expanded into a typology as follows. As knowledge is refined there is a progression along the following stages [Holma et al., 1997]:

Data -> Information -> Knowledge -> Understanding -> Wisdom

Of these, data and information are clearly explicit by nature. Data can be analyzed to create information, which can be distributed for example in books, videos and reports. This also agrees with Röll's categorization. The stages from

knowledge onwards contain more and more personalized and tacit elements. As knowledge gains in value, personalization and applicability it progresses into understanding and gradually becomes wisdom.

2.3 Perspectives into tacit knowledge

It's useful to make additional distinctions in order to more clearly form a picture of the whole of the tacit aspects of knowledge. Let's think of understanding tacit knowledge as a map and different aspects of tacit knowledge as descriptions (on the map) of actual places that the map describes. One aspect of tacit knowledge described above can be called embodied skill, or know-how of the body.

Another aspect, that is useful to describe on our map of tacit knowledge, is an instinctive knowing about how things work. This could also be called "mental models". Such knowing is acquired through experience, instinctively learning cause-and effect assumptions one learns to hold true for self. Instinctive knowing is acquired differently than information from textbooks. Rather than reading the information, it is created by experience. An example when a mental model is learned quickly is when a child touches a hot stove, a certain way of delivering a sales pitch consistently works exceptionally well, or when somebody makes a very good impression and it transfers to similar people as well.

Mental models come into play for example when a sales negotiator instinctively knows he should use a different approach when selling to some person as compared to another.

Aspects of tacit knowledge include the following:

- Mental Models (how things really work, models of the world, assumptions) [Senge et. Al., 1994].
- Know-how of the body (performing skills like swimming or carpenting) [Polanyi, 1966].
- Tacit knowledge in feeling, a "Gut sense" of intuitions in situations.
- Social knowledge (phronesis, presented in chapter 2.4), managing social situations [Baumard, 1999].
- Wits and cunning (metis, presented in chapter 2.4) in situations where established rules do not apply [Baumard, 1999].

The researcher would like to emphasize the vastness of the phenomenon of knowledge. As such, the aspects of knowledge would be well understood as perspectives taken. One way of thinking about this is like taking photographs of a statue from different directions, including the inside. This is because all models are, by definition, generalizations, and they all bring a certain perspective to what is being examined.

2.4 Greek knowledge: Episteme, techne, phronesis and metis

The Greek language has a richer description of types of knowledge than English. Another way of understanding knowledge is to subdivide it into four aspects, the definitions of which have been handed down to us since Aristotle:

Table 2 Summarizing aspects of knowledge [Carlson, 2006].

Form of knowledge	*Epistemology*	*Methodology*
Episteme ***(universal)***	***abstract generalizations***	***abstraction, deduction***
Techne ***(technical)***	***capability, capacity to accomplish tasks***	***observation, appropriating rules***
Phronesis ***(cultural)***	***practical and social wisdom***	***socialization, imitation***
Metis ***(practical)***	***conjectural intelligence***	***ruse, shortcuts, cunning***

Explicit: Episteme (universal), Techne (technical)

Tacit: Phronesis (cultural), Metis (practical)

Epistemology is the theory of knowledge. It's the "how you know what you know" [Dilts, 1998]. Epistemology specifies the form a particular kind of knowledge takes and the domain where its validity is verified.

Methodology refers here to the methods by which a particular kind of knowledge is used and how it can be learned or obtained.

Episteme:

"Episteme is knowledge 'about' things, the opposite of phronesis, which is the result of experience and social practice". [Baumard, P. 1999]. Episteme produces understandings and generalizations. This type of knowledge is created through abstractions and deductions. It is close to science and it is the dominant type of knowledge in formal education. Episteme is usually a product of long maturation.

Techne:

Techne is technical knowledge as well as the practical know-how of how to put skills into practice and accomplish tasks. It is for example the skill of the engineer and the carpenter.

Phronesis:

Phronesis is the wisdom of social practice, the skills and understandings needed to thrive in social contexts. It is a form of cultural and emotional intelligence. Phronesis is personal, and has profound meaning only for the individual who has lived the experience. “This non-scientific, practical, contextual knowledge is generated in the intimacy of lived experience. It is acquired by trial and error, through organizational and environmental learning, and is generally very difficult to analyze or test.” [Baumard, 1999]

Metis:

Metis emerges after explicit knowledge skills are fully assimilated by the craftsman. Best described as cunning, thinking with your feet etc., it is knowledge applied when there are no rules and there is no real framework for devising the solutions. Metis is a high, unpredictable form of cleverness that can be used both for "good" and "bad". Whereas episteme seeks truth metis seeks results. [Carlson, 2006]

Table 3 Typology of categories of knowledge according to Baumard. [Baumard, 1999], 55.

	Episteme	**Techne**	**Phronesis**	**Metis**
Definition	Abstract generalization	Capability, task accomplishment	Practical and social wisdom	Conjectural intelligence
Cohesiveness	hiererchical	encapsulated	organic	mutable
Horizon	indeterminate	perennial	life	ephemeral
Field	universal	systems	people	situations
Structure	hard	hard and soft	soft	furtive
Nature	abstract and objective	abstract and practical	abstract and practical	practical, oblique
Goal souht	scientific truth	structure	wisdom	results
Emergence	maturation	experience	social interaction	unpredictable
Process	sequential	hybrid	hybrid	simultaneous
Elaboration	positive	hybrid	hybrid	relative
Method	abstraction, deduction, idealization	observation, study, recipes	learning socialization imitation	combination, regeneration, ruse, shortcuts
Preservation	laws, principles, representations	manuals, communities of practice	clans, culture, ethnic goups, personality	discretionary, intimate, clandestine
State	substance	accumulation	initiation	transient
Teaching or initiation	analysable, easy to communicate, standard	hybrid, with a tendency towards the explicit	hybrid, with a tendency towards the tacit	complex, tacit, difficult to communicate

It is essential that all of these are conjoined in following the same vision. “At its highest level of functioning a knowledge creating organization achieves a harmonious integration of these four epistemologies while processing either sequentially or in parallel the various phases of knowledge transformation.” “The ability to integrate these unique epistemologies and enact them with finesse often determines the success an organization will have when utilizing its ingenuity to penetrate challenging environments.” [Carlson, 2006]

2.5 Tacit knowledge - a knowledge management perspective

According to [Sveiby, 2001], knowledge management basically has two tracks. There are the IT-Track and the People-Track. Both of these tracks are understood to exist on an organizational as well as individual level.

The IT-track is concerned with management of information. To people in the IT-Track *Knowledge* = *Objects* that can be identified and handled in information systems. This track has brought with it things such as databases, data warehousing and interactive IT web pages. Investments in this track mean mainly investments in information systems. [Sveiby, 2001]

The People-Track is concerned with management of people. People in this track are "primarily involved in assessing, changing and improving human skills and behaviour". In this track, knowledge is understood as a "complex set of dynamic skills, know-how etc, that is constantly changing". Knowledge management in this track involves learning and managing these competencies individually or on an organizational level.

The issues in People-Track are about "maximizing the ability of an organization's people to creating new knowledge and building environments conductive to sharing of knowledge". The focus is on creating sustainable creative organizations. The bandwidth of the human infrastructure is seen as trust between people and between management and employees. Investments in the people-track involve investing in people, recruitment, spending time on proper dialogue, creating environments without fear etc.

Table 4 Briefly summarizing levels of knowledge management. [Sveiby, 2001]

	Knowledge management	
Track/Level	**IT-Track**	**People-Track**
	Knowledge = Object	***Knowledge = Process***
Organization level	***“Re-engineers”***	***“Organization theorists”***
Individual level	***“AI-specialists”***	***“Psychologists”***
	”E-specialists”	

According to [Nonaka et Al., 2000], “The `knowledge management' that academics and business people talk about often means just `information management'.” This seems to suggest that knowledge management has been focusing mostly on managing explicit knowledge, for which information technology provides suitable means.

In this study tacit knowledge is understood as a process, a people-track phenomenon. Information technology is taken into account as an additional means to facilitate the exchange between processes of knowledge between people. In the People-Track, knowledge is understood as not something to be "managed", but as a human faculty. Guiding thoughts for thinking about knowledge in this track are phrases such as "to be knowledge focused" or to "see" the world from a "knowledge perspective" [Sveiby, 2001].

Sveiby defines his personal meaning of knowledge management as "The art of creating value from intangible assets". This definition fits nicely with the perspective taken in studying tacit knowledge as well. The study focuses on the people-track, with IT examined as a facilitating means in some research areas, on both the individual and organizational levels. On the People-track, IT would well be used to facilitate conversations.

3 Knowledge work

There is an ongoing shift from the industrial age to the knowledge worker age. During industrialization when the value of industrial work became thirty times bigger than the value of contemporary farming and we seem to be experiencing a similar kind of shift again. [Covey, 2004]

Compared to other kinds of work like manufacturing or providing non knowledge-intensive services, knowledge work is highly invisible. Most of the value-creating process takes place inside the knowledge workers' heads and the steps are difficult to track precisely. From the tacit knowledge point of view, the productivity tools of information technology leave no trace by default of the intermediate stages of work. Before information technology these stages were visible as notes, second-version slides of a presentation with comments written on them etc.

Röll (Röll, 2004) suggests the following processes for knowledge work. He bases these on Efimova's (Efimova, 2004) work, adding himself "finding codified information". Since these were discovered through a study of knowledge work using weblogs, this shows those processes in particular that studying work using weblogs helped make visible.

Table 5 Knowledge work processes [Röll, 2004].

- Organizing personal information ("Personal information management")
- Making sense of information (personal)
- Negotiating meaning (social)
- "Creating" new ideas
- Establishing and maintaining a personal network
- Collaborating in communities
- Finding (codified) information

Before knowledge work, too much independent thinking on the workers' part was considered as a threat to quality of production. If a worker would deviate too much from the manufacturing process, that would most likely cause variance in the results and quality of the standardized process as a whole would suffer. It seems that mostly technical skill (explicit techne) was required in manufacturing processes. In knowledge work, there is really no standardized process which would require repeating over and over of mechanical actions. Every situation is slightly different and the work becomes more focused on how to handle each emerging situation appropriately.

In situations where there is no one clear-cut solution, the use of all of modes of knowing together becomes important. The above processes require all episteme, techne, metis and phronesis, or both tacit and explicit forms of knowledge.

The understandings of tacit knowledge may bring more light onto what happens inside knowledge work and how, specifically, do the best people do their work and what differentiates their way of working from others. Then, the next question would be what of that which was learned about the best individuals should also be taught to others.

4 Enabling knowledge creation and sharing of tacit knowledge

It is different from understanding a phenomenon to actually make it happen. This section focuses on how to have tacit knowledge being shared and made use of. While the former section focused on understanding intellectually what tacit knowledge is, this section focuses on what is needed in order for tacit knowledge to be made use of as desired.

Let's have an analogy: One may understand gardening and plant nutrition theory, but it is something different to actually start growing a garden according to one's desires. Taking that analogy, the previous section is written with the perspective of understanding a garden and the purpose of this section is to provide useful information for growing one.

First a model of knowledge creation from the interactions between tacit and implicit knowledge is presented. After that, enabling factors will be discussed. At the end of this chapter methods, tools and actions are presented that can be used to boost the transfer and use of tacit knowledge in an organization.

4.1 Model of knowledge creation (SECI)

This section presents a model of how knowledge is created through interactions between tacit and explicit types of knowledge.

Nonaka and Takeuchi assert that knowledge is created through the interactions between tacit and explicit knowledge. They present a theory of organizational knowledge creation which describes four types of mechanisms of knowledge creation.

The researcher understands these as processes that don't need to be explicitly "made happen", like the processes of an HRD department do. Instead, the researcher understands this as something that is always "already happening" in the background of any activities. "Making knowledge creation happen" does not seem to mean placing an order and giving instructions, but rather becoming aware of what is already happening and taking conscious influence on it, to steer the process in a desired direction.

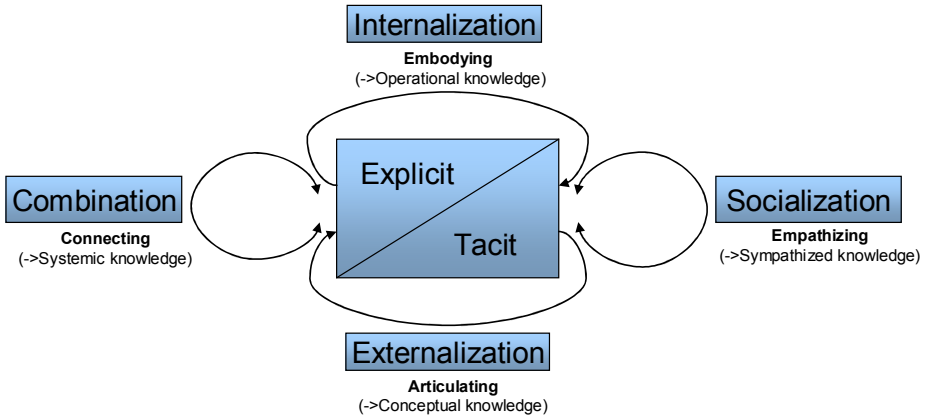

Figure 3 Model of Organizational knowledge creation [Nonaka et Al., 1995]

Internalization (explicit to tacit)

Internalization happens when an explicit concept or piece of knowledge is embodied and utilized. Closely related to learning by doing, internalizing produces operational knowledge that a person utilizes in his actions. Internalizing explicit knowledge can also happen by reflecting on it. This should be contrasted with memorization, where a person can recall a piece of knowledge but does not show evidence of applying it in his actions. Internalization produces operational knowledge. “When knowledge is internalized to become part of individuals’ tacit knowledge bases in the form of shared mental models or technical know-how, it becomes a valuable asset” [Nonaka et Al, 2000].

Externalization (tacit to explicit)

Opposite to internalization, externalization is the process of articulating tacit knowledge into explicit knowledge. When an internally held piece of information is described through metaphor, analogy, or model, knowledge is crystallized [Nonaka et Al., 2000]. An example of this is concept creation in new product development. Externalization is often driven by metaphor or analogy and is triggered by dialogue or collective reflection [Nonaka, Takeucki. 1995].

Socialization (tacit to tacit)

Socialization is a process where tacit knowledge is acquired and transmitted tacitly. Situations, stories and conversations contain learnings that affect people, although they seldom pause to think how they were affected. Socialization happens rather visibly in a master-apprentice relationship, or while intuitively picking up shared mental models while interacting in a group. Through socialization an individual acquires tacit knowledge from others without the

contents being articulated directly. The knowledge acquired by socialization comes often in forms of shared mental models or technical skills.

Combination (explicit to explicit)

“Combination is the process of converting explicit knowledge into more complex and systematic sets of explicit knowledge” [Nonaka et Al., 2000]. Examples of such a process are designing a prototype, putting together a user's manual for a new product or even the breakdown of concepts such as corporate vision into operationalized business or product concepts [Nonaka et Al., 2000]. Combination yields what Nonaka and Takeuchi call "systemic knowledge" [Nonaka, Takeuchi, 1995].

Each form of knowledge creation has a language and way of communicating that best suits the form at hand. For example, socialization works best through the non-verbal communication that carries meanings that are not expressed verbally from one person's tacit to another one's tacit knowledge. In explication tropes such as metaphor, idioms and analogies work well to help express what is present as a gut feeling or intuition. In combination, by contrast, clear and explicit language is needed.

These modes of knowledge creation interact with one another in all combinations. Knowledge that is first socialized can be made explicit through externalization and then combined into a new concept which then can be internalized and socialized to one's colleagues. In addition to what is presented in this model, the researcher would also emphasize reflection as a form of personal knowledge creation.

4.2 Enabling knowledge creation according to Nonaka et Al.

According to Nonaka et Al, "the knowledge-creating process cannot be managed in the traditional sense of 'management', which centers on controlling the flow of information. Managers can, however, lead the organization to actively and dynamically create knowledge by providing certain conditions." These conditions include setting a knowledge vision, understanding knowledge assets, promoting knowledge-creation as well as providing autonomy, redundancy, trust and commitment. [Nonaka et Al., 2000]

A model for knowledge creation is proposed where knowledge is created using the SECI-process through the organization’s existing knowledge assets in a special

space for knowledge creation ("Ba"). Since this process takes into account tacit and explicit knowledge, tacit knowledge is by necessity shared and put into use.

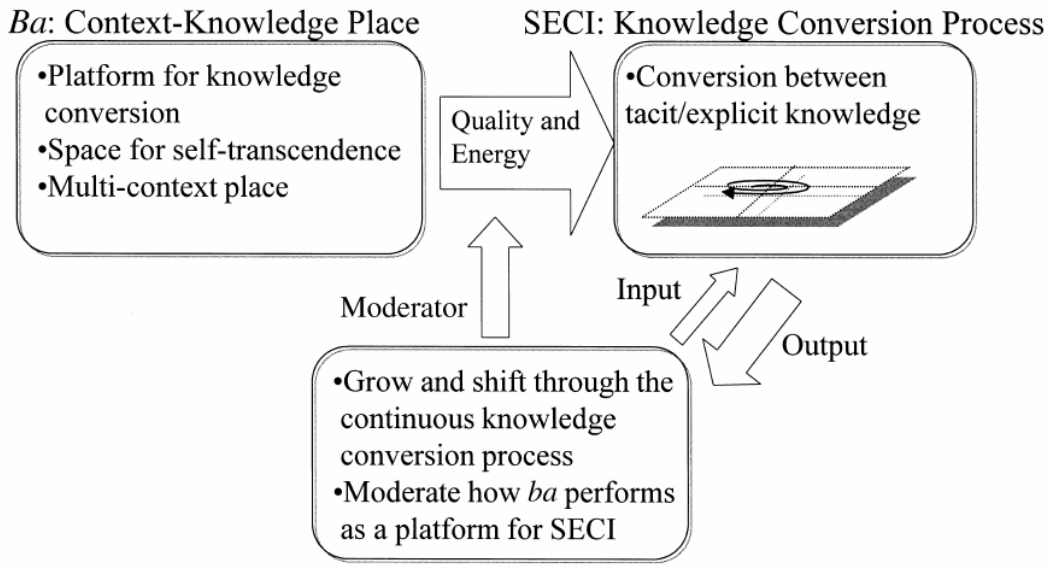

Figure 4 Three elements of the knowledge-creating process according to [Nonaka, 2000], 8.

Setting the knowledge vision

The top management's responsibility is to set a knowledge vision and communicate it to others within the organization. The purpose of this vision is to synchronize the entire organization and give direction to what kind of knowledge should be created in what domain. This vision should hold answers to such fundamental questions as "What we are", "What should we create", "How can we do it", "Why are we doing this", and "Where are we going". The knowledge vision helps determine how the organization and its knowledge base develop over the long term.

"Serving as a bridge between the visionary ideals of those at the top and the chaotic reality at the front line, the middle then has to break down the values created by the top into concepts and images that guide the knowledge-creating process." [Nonaka et Al., 2000]

Knowing the knowledge assets

Examples of knowledge assets are portrayed in the picture. It is only by knowing them that the organization can consciously facilitate their interaction in sharing tacit knowledge and in creating new knowledge. Besides knowledge assets

themselves, it is important to distinguish between the different natures of knowledge assets.

Table 6 Categories of knowledge assets according to [Nonaka et Al., 2000], 20.

Experiential Knowledge Assets Tacit knowledge shared through common experiences • Skills and know-how of individuals • Care, love, trust and security • Energy, passion and tension	**Conceptual Knowledge Assets** Explicit knowledge articulated through images, symbols, and language • Product concepts • Design • Brand Equity
Routine Knowledge Assets Tacit knowledge routinized and embedded in actions and practices • Know-how in daily operations • Organizational routines • Organizational culture	**Systemic Knowledge Assets** Systemized and packaged explicit knowledge • Documents, specifications, manuals • Database • Patents and licences

Managing the knowledge-creating process

Managing the knowledge-creating process includes understanding what knowledge assets are needed, energizing "Ba" and managing the interactions of knowledge assets according to knowledge vision. This requires a sort of "distributed leadership", where the top and middle management's role is in reading the situation as well as leading it. [Nonaka et Al., 2000]

Knowledge must be nurtured rather than managed. In the cases of successful knowledge creation processes studied by [Nonaka et Al., 2001b], the top management "did not try to manage the knowledge-creation process directly, instead they provided a platform where individuals could engage in meaningful dialogue and real-time interaction and thus share and create knowledge.

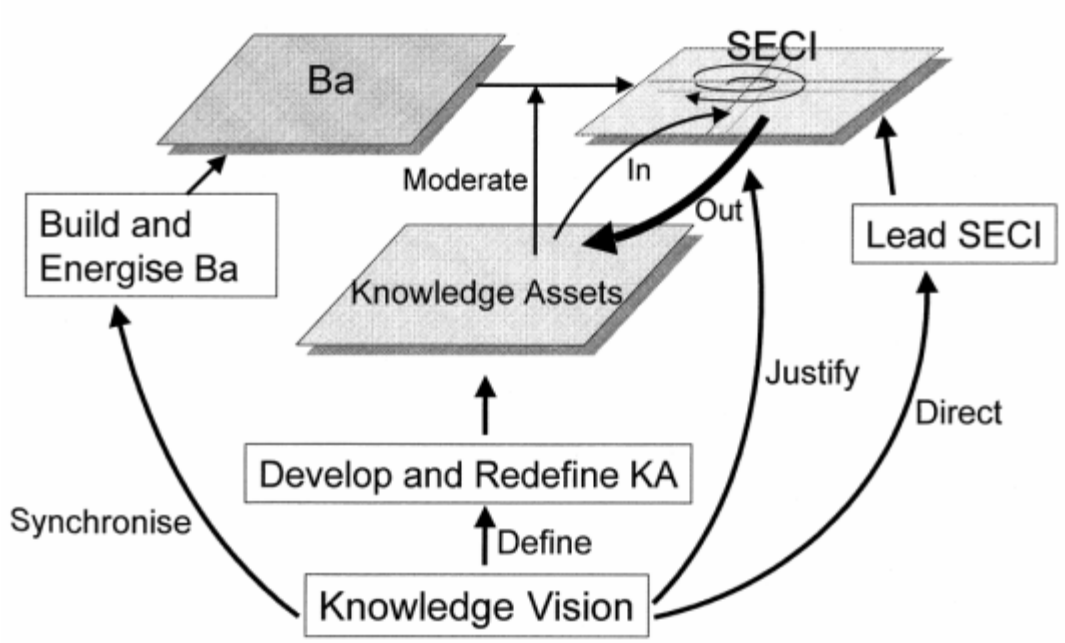

Figure 5 Leading the knowledge-creating process according to [Nonaka et Al., 2000], 19.

For the described process to work, certain conditions need to be present. These conditions include setting a knowledge vision, understanding knowledge assets, promoting knowledge-creation as well as providing autonomy, redundancy, trust and commitment. [Nonaka et Al., 2000]

4.3 Ba

Ba refers to a space for knowledge creation. Not only a physical place, Ba also refers to a mental atmosphere conductive for participating in creating new knowledge. It has a reflective quality to it, characterized by an atmosphere of trust and mutual creation. It is described by Nonaka et Al. as "Shared context in motion for knowledge creation" [Nonaka et Al, 2000]. The key concept for understanding “Ba” is interaction.

Ba is not just about the environment. Rather one might say that "Ba" refers to the processes which creates place. "Just as the useful part of a cup lies at the emptiness in its centre where the drink is held, a useful ‘Ba’ is found within the reflective spaces which are contextualized by a proper atmosphere and spirit. A good ‘Ba’ is a place of knowledge creation which inspires creative imagination and crystallizes intention." "The quality of place has long been crucial for an artist to fully realize her artistic vision. Similarly, in a good “Ba”, an organization utilizes a creative space to further its pursuit of excellence and innovation". [Carlson, 2006b]

"People have to trust each other to provide the right insights, unafraid that they are disclosing their secrets or giving too much of themselves." "They have to be sure that what they are being told is honest and that no one has any hidden agendas to co-opt the knowledge which is being shared by them. Therefore, the transaction by which knowledge is shared must be built on trust." [Carlson, 2006b]

The Finnish sauna has sometimes been given as an example of such a space for knowledge creation. Ba could be considered the social and cultural space where creating knowledge is safe, culturally expected and individually rewarding as well.

Also, there will most likely be multiple Ba inside an organization, which should be synchronized around the same knowledge vision.

4.3.1 Types of Ba

The different kinds of knowledge-creation modes (externalization, internalization, socialization, combination) not only each have ways of communicating that best suit them, but also a space that best supports each process of knowledge-creation. [Nonaka et. Al., 2000]

Originating Ba is described as a context for sharing experiences, feelings, and mental models. It is mainly defined by individual and face-to-face interactions and offers a *context for socialization*.

Dialoguing Ba is described as a context for sharing mental models and skills, converting them into common terms, and articulating as concepts. Dialoguing Ba is defined by collective and face-to-face interactions and offers a *context for externalization*. Selecting individuals with the right mix of knowledge and capabilities is the key to managing knowledge creation in dialoguing Ba.

Systemising Ba is described as *a context for* the *combination* of existing explicit knowledge. It is defined by collective and virtual interactions. Information technology, for example can offer a useful virtual collaborative environment.

Exercising Ba is described as a context where individuals embody explicit knowledge. It is defined by individual and virtual interactions. “Exercising Ba Synthesises transcendence and reflection through action” [Nonaka et Al, 2000] and mainly offers a *context for internalization*.

4.4 Methods, tools and actions

This section explores methods and methodologies for transferring tacit knowledge. An overview is presented first and later some of the methods are examined in detail.

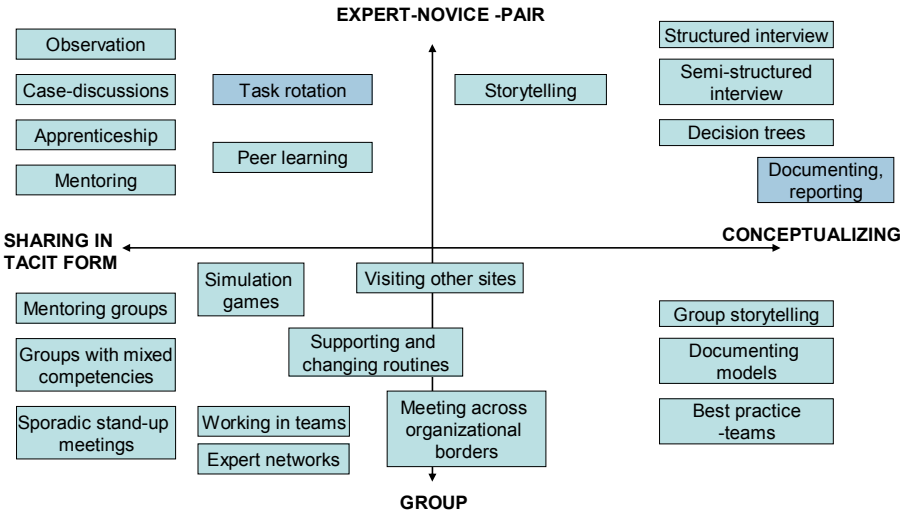

Figure 6 Methods for transferring tacit knowledge [Rintala & Kuronen, 2006] as referenced by [Kuronen et Al., 2007], 22.

Although not complete, the above list presents a rather comprehensive picture of means of transferring tacit knowledge. The methods are categorized according to amount of conceptualizing and amount of people involved. When there is little conceptualizing, the methods transfer knowledge from one person's tacit to another person's tacit knowledge. The other person will be able to perform the action or use the knowledge learned, but may not be able to well articulate it.

The methods where there is a lot of conceptualizing rely on making tacit knowledge explicit. This has the advantage of being able to distribute multiple copies of the explicit form of knowledge through books or communication technology, and to critique it more openly. The disadvantage is that on the way to becoming explicit, by necessity, a portion of the original knowledge, like "gut feelings" has to be left unexpressed. These cannot be made explicit in and of themselves, but instructions for having similar experiences necessary for developing them can be developed and made explicit.

Communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly. Membership to a community of practice implies a commitment to a domain of

interest and therefore a shared competence that distinguishes members from other people. Communities of practice are ideal forums for sharing knowledge and information around an area of practice. [Wenger]

Apprenticeship is probably the oldest method of transferring knowledge and expertise. An inexperienced person works together with an experienced person, observing him and receiving guidance for his work. Such close co-operation is especially good for transferring knowledge through socialization. It's useful to notice that both the "good" and "bad" ways of working tend to transfer when sharing expertise in this way. Over time the apprentice learns to work independently and can also have his own apprentices. Working in pairs could also be considered "mutual apprenticeship" and is also an effective form of transferring knowledge through socialization.

Mentoring While apprenticeship focuses mostly on learning skills, mentoring emphasizes coaching [Kuronen et Al., 2007]. The role of the mentor is more like an advisor. Meetings are also less frequent than in an apprenticeship. Key factors for successful mentoring include commitment, scheduling meetings, openness and trust [Kuronen et Al., 2007].

Rotation of assignments is one way to develop comprehensive skills in employees. The rotation can be carried out either in short periods, for example through temporary posts or fully by shifting assignments. Also a development plan could be made in a team, where the necessary knowledge of a team as a whole is expanded to become knowledge of each of its members. [Moilanen et Al., 2005]

Organizational Storytelling. Stories can be effective ways of transferring knowledge and understanding. An example: "The tradition of an oral narrative history that records and hands down learning, insight or collective revelation still thrives in social communities and Shell has found it particularly effective in helping change our business mindset and improve our knowledge practice. The power of a good story well told can inspire innovation, personal challenge and professional breakthrough. Stories can encourage us to change, to think 'out of our boxes', to seek the help of others in leveraging our own efforts". [Shell corporation, 2001].

Modelling skills and mindset is the process of breaking these down into small enough chunks so that they become learnable to others. What separates this from apprenticeship, for example, is an explicit methodology for breaking down skills

and understandings into transferable components. This methodology contains distinctions in breaking down ways of thinking, actions and distinctions for training perception. Some of these distinctions are applied in appendix I in instructions for new employee introduction. [Dilts, 1998]

4.5 Natures of factors influencing sharing of knowledge

The purpose of this chapter is to provide a framework for examining different natures of aspects influencing knowledge sharing from a broader perspective than in the previous chapters. These are discussed by examining sharing tacit knowledge through part of Ken Wilber's integral theory. [Integral Naked, 2004]

Ken Wilber has designed a vastly comprehensive framework for understanding the human experience, of which the most relevant part is presented here. In all endeavours where people are involved, there are the individual and collective aspects, as well as the internal and external (or subjective and objective) aspects. These are categorized and named as below. The model asserts that all of these map quadrants (Intentional, Behavioural, Cultural, and Systemic/Social) are real, all are important, and all are essential for understanding our world. [Integral Institute, 2007]

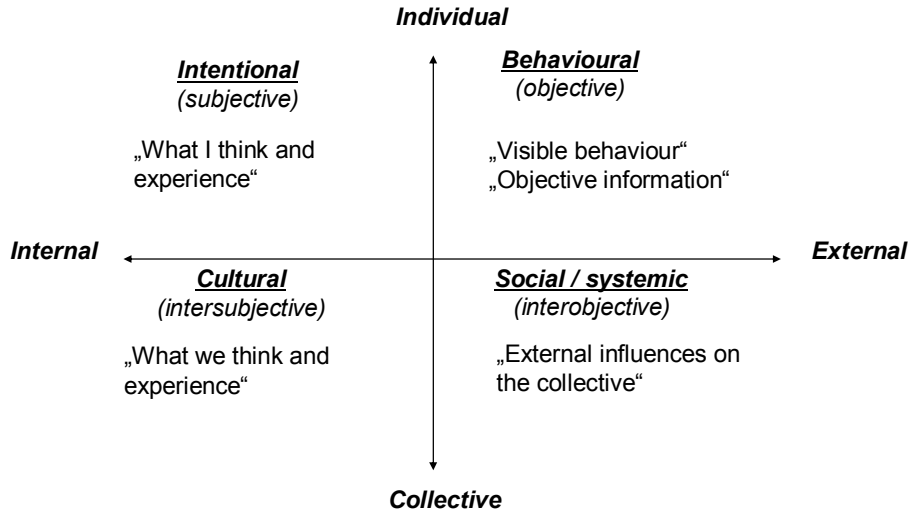

Figure 7 Integral four quadrants, summarized from [Cook-Greuter, 2006].

The integral theory attempts to systematically take into account things of different natures, which often receive attention only by themselves. For example, scientific thinking has a high bias towards the external or objective quadrants of the map above. Focusing only on these for promoting knowledge sharing would

discount the subjective factors influencing willingness to share knowledge, such as trust between people.

More often than not people tend to focus on factors from one or two domains, neglecting the others. This happens for example when promoting a new organizational culture (cultural) while the employee compensation system (systemic) keeps steering in the old, contradictory direction. The more these influences are aligned, the more likely it is for the desired actions to occur. On a larger scale, the full integral theory attempts to be a holistic map of human experience and development.

When we expand on these domains, below are examples of things that need to be taken into account for each nature.

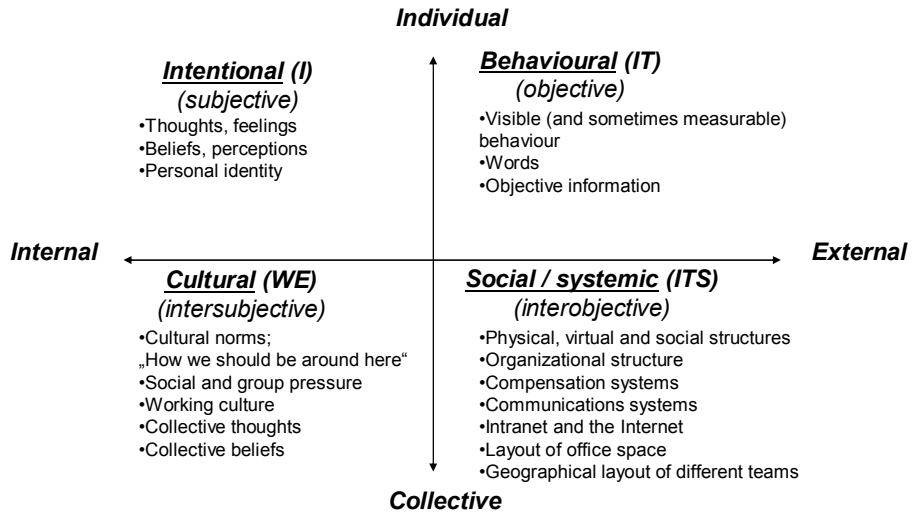

Figure 8 Integral four quadrants applied to operating in an organization.

If we examine sharing knowledge and managing knowledge sharing in our research areas, here is one way to populate the quadrants.

Cultural aspects to be taken into account:

- Trust, way-of-working, collective attitudes, engrainness of habits of working.

Systemic aspects to be taken into account:

- Communication systems, nature of electronic workspaces, compensation and recognition systems (visibility and acknowledgement of knowledge producers), organizational structure, openness or closedness of information systems to other teams/departments

Behavioural aspects to be taken into account:

- Is knowledge being shared or not? How does it happen? What do people do and say about knowledge sharing.

Intentional aspects to be taken into account:

- The old "Wii FM Radio" – "What's in it For Me", fear of misusing personal and sensitive information, trust, individual attitudes, and desire to be recognized among colleagues.

All of these areas should be acknowledged. In minimum, by mapping those out it can be understood what kinds of influencing forces we deal with. Optimally a solution is devised that takes all of these into account. In the results chapter, this framework has been specifically applied to the research area of electronic workspaces.

4.6 Using theory on enabling knowledge creation in this research

The methodology of modelling skills and mindset was used in the practices for new employee introduction. The integral model was used in analyzing the concepts for enabling knowledge creation created in the area of electronic workspaces. The SECI-model was used to identify and understand what kind of knowledge-creation each proposed tool belongs to and to understand the dynamics of interactions between tacit and explicit knowledge.

5 Research areas in light of theory on tacit knowledge

This section examines each of the research areas from the tacit knowledge perspective. Theory is presented on each area, and it is attempted to connect with understandings from the previous chapters.

5.1 New employee introduction

Professional know-how is a basic requirement for an expert organization's success and existence. Depending upon the task it can take up to three months, a year or three years before a new employee has fully internalized his work and can be given similar responsibilities as the organizations most experienced employees. During this time there are costs that come from educating and from the productivity gap in the beginning, before full productivity is reached. [Valpola, 2005]

When a new employee arrives he comes into an unfamiliar territory. A likely goal for introducing new employees would be to help provide them with skills and understandings that they need to work and feel well in the new environment. It is not only the work that may require learning however, but also the culture, establishing necessary professional contacts, and internalizing ways of working that are compatible with the organization.

A study was done by a British government appoint apprenticeship task force in England that shows several benefits for apprenticeships. Since apprenticeship is a central form of transferring tacit knowledge, similar kinds of benefits could be expected from other practices dealing with tacit knowledge as well. [Apprenticeship task force, 2005]

- Apprenticeships improve business performance by making contributions to competitiveness, profitability, productivity and quality.
- The net costs of Apprenticeships training are frequently lower than those involved in training non-apprentices and the productivity of apprentices enables employers to recover much of the costs involved.
- Apprentices more easily adopt company values, are more likely to remain with the employer than non-apprentices, and become part of a wider pool of talent that can be drawn upon by all employers in the sector.

- Seeking to increase the diversity of the apprentice workforce will have significant business benefits, as will providing clear progression routes from Apprenticeship to higher levels in the organisation.

When comparing these to the mental models and social knowledge, which were presented in chapter 2.3 we can see that more easily adopting company values comes from the sharing of tacit knowledge regarding what is important in the company. Making contributions to productivity and quality is the likely result of acquiring tacit knowledge in the forms of know-how and "gut sense" intuitions in situations. For making use of tacit knowledge in general, the benefits mentioned above by the apprenticeship tack force could be expected as well.

5.2 Virtual teams

Virtual teams are becoming an increasingly common way of working in organizations. A virtual team is defined here as a team whose members work mostly separately from each other and who communicate mainly through interaction technology.

Advances in communication technology and internalization are both leading to widely distributed co-operation. The major advantages of virtual teams lie in transcending space and time, as well as in being able to pull best people to work on a project from a potentially global network. Ways of working in virtual teams are still on their way of becoming mature.

The context of virtual teams differs from that of physical teams in several ways:

- Little amount of direct face-to-face communication
- Very little information about the context of far-away team members [Hinds, Mortensen. 2005]
- Able to transcend space and time in communication
- Increased likelihood of encountering of cultural differences

These would suggest that virtual teams need to plan alternative ways of sharing the social knowledge between team members and also to find ways to compensate for the environment's poor suitability for socialization.

Team distributedness, which is related to virtualness, can be broken down into the following dimensions [Vartiainen et Al., 2005]:

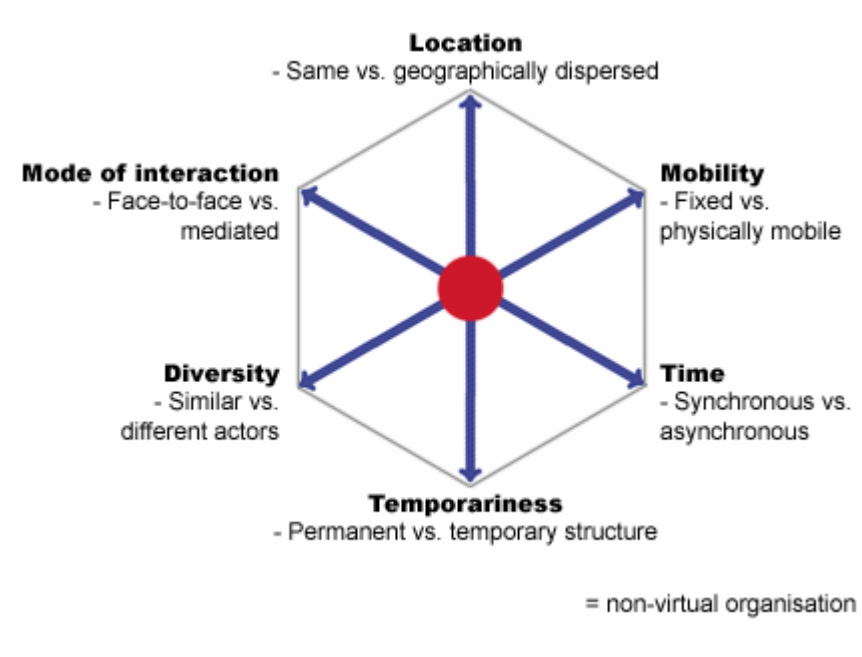

Figure 9 Dimensions of distributedness of work. [Vartiainen et. Al, 2005], 43.

In a study of 43 geographically distributed and colocated research & development teams and 288 employees, shared identity was found to lessen conflict between people and shared context lessened conflict related to carrying out tasks. It's logical to assume that these factors influence knowledge sharing as well. In the study, both of these factors were affected positively through spontaneous communication between team members. "When co-located, team members are able to easily see what their colleagues are doing, identify dissimilar work processes and understand the source of coordination problems." [Hinds, Mortensen. 2005].

From a tacit knowledge perspective, conditions required for developing trust and connectedness required to share (sometimes personal) knowledge are less present in virtual teams, and so are the non-verbal gestures that carry tacit information. People do not feel they know each other and do not trust each other necessarily nearly as well as if they were already used to interacting with each other face-to-face. Awareness of team members' context is also minimal.

When there is a need for co-creating or explicating concepts with people of not-shared context or identity it could be wise to get together face-to-face in order to perform the needed activities. Kimball and Digenti have created a four-stage model for a virtual team's lifecycle (Figure 10). They recommend communicating

frequently, establishing and keeping pace and agreeing on active participation. [Kimball, Digenti. 2001]

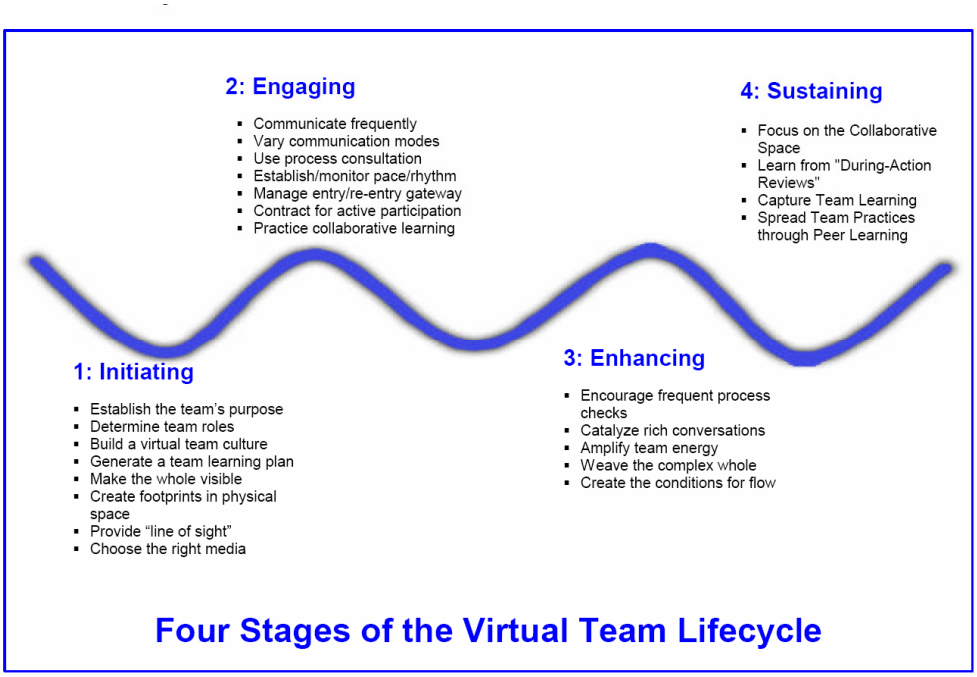

Figure 10 Four-stage model of a virtual team's lifecycle. [Kimball, Digenti. 2001], 6

The richness of transferring non-verbal aspects of communication through interaction technology is much poorer than in face-to-face interactions. As the environment of communication is different we need to re-valuate ways how we communicate understanding and interact with one another. A perspective on this could be to research what is absent from virtual communication that is implicitly there in the office that contributes to communication. In a virtual environment the early cues on a person's face to noticing understanding or confusion will generally be less available than in normal face-to-face interactions. If key concepts are understood differently there will be later challenges to co-operation. There is a need to understand anew how to carry over the depth of face-to-face interaction into the context of virtual organizations and interaction technology.

5.3 Electronic workspaces

Knowledge (or information) in electronic workspaces comes mostly in textual form. As many of the communication "sub channels" (like facial expressions and intonation) are lost in textual form, it would seem that of the four modes of knowledge creation electronic workspaces offer the richest context for combination.

Having raw material for this process requires externalizing new knowledge for combination. Examples of this can be concept creation or noticing a situation similar to that which one has experience of and sharing that experience through a short description. Following this thinking, to get the most out of knowledge sharing through electronic workspaces would mainly mean enhancing the knowledge-creation processes of explication and combination.

This does not mean that using electronic workspaces to transfer knowledge would be limited to only these two. A considerable amount of information on communication's "sub channels" can be brought back, for example, when using video clips or audio communication. And also in text and especially stories there will be information "between the lines". A worthwhile goal would be to have a "Cyber-Ba" or a "virtual water-cooler" where people randomly and informally "meet" each other' ideas and exchange knowledge. Another function would be a virtual systemizing "Ba", where knowledge is refined through combination [Nonaka et Al., 2001].

Electronic communication tools can augment communication in a way that face-to-face and real-time communication is not capable of. These can facilitate conversations and connect people from different parts of the globe. The scope of who you can reach with your communication can be expanded dramatically by using communications technology. This is true especially for asynchronous communication that does not require that both parties to be present and communicating with each other at the same points in time.

In 2001, Nonaka et Al. have discussed the impact of new information technologies on business practices, and on new product development. They suggest that while no firm can afford to ignore communications technologies face-to-face interaction remains crucial in most stages of knowledge-creation. Boeing for example emphasizes co-location of project members despite having one of the most advanced computer networks in the world. Even with advanced information technology all communication cannot be replaced effectively and the need for face-to-face interaction among employees remains. [Nonaka et Al., 2001]

Also, having equal and simultaneous access to editing a shared document, or having both speech and text communication channels give in some cases more flexibility, as in when transferring telephone numbers or web page addresses. It

can be substantially easier to share ideas, relevant links, or put together information from different sources when more channels are available.

6 Research methods and the environment

This section describes the information gathering and analysis methods as well as the research environment. There is also a storylike description of carrying out the study at the end of this section.

6.1 The Organization

TietoEnator Digital Innovations is a horizontal organization in TietoEnator Corporation. TietoEnator Digital Innovations specializes in self-service applications that emphasize ease of use and the end-user's perspective. It combines TietoEnator's best practices, innovations and deep industry expertise for the benefit of all the Group's companies and business units. As of April 2007, Digital Innovations has 600 employees in nine countries. The research was performed in Finland.

TietoEnator is consulting, developing and hosting its customers' digital businesses. TietoEnator provides these services in six industry sectors including forest and energy, healthcare, and banking. It has about 16,000 employees in close to 30 countries.

6.2 Research environment

Although the organization is already international there was mostly local business in different countries at the time of research. People in one country served customers in their own country, and generally not other countries. With more and more customers going international there was a need for similar service interface and the same quality of service for the customers in all countries. That, in turn, required active co-operation of sharing knowledge and practices between people in different countries.

The business in Finland is already ripe. Most of knowledge transfer happens from Finland to the start-up countries. The Finnish organization in turn has been growing through many mergers and is facing a significant task of uniting itself culturally.

The corporate unit for which the study is made is growing rapidly at the time of this study. Most of the growth is international. There is a need to increase cross-border collaboration, combine competencies and make sure units in different countries deliver service according to international quality requirements.

The rapid international growth creates a need for operating as a virtual organization. Communication tools for cross-border co-operation are well available. What is still needed are internalized and effective practices for using them and a cultural maturation related to knowledge sharing that is necessary for co-operating successfully in a cross-border environment.

6.3 Research and information gathering methods

This section describes and summarizes the research methods chosen for each area. As each of the research areas are different by nature, alternative research methods were chosen for some of the areas.

Most of the information was gathered through semi-structured interviews. First there was a pre-study consisting of ten interviews to understand the organizational context and needs of the organization in order to focus the research in the most appropriate direction. The research methods and amount of interviews are summarized in Table 7.

Table 7 Summarizing research methods for each area of research

Area of research	***Number of interviews***	***Other methods***
Pre-study	*10 x 45..90 min*	
Employee introduction	*3 x 60..90 min*	Testing appropriate tools, HR-discussions
Electronic workspaces	*0*	Web-questionnaire (60 answers), Workshop
Virtual teams	*4 x 90 min*	
External knowledge gathering	13 x 90 min (from 4 companies)	*(Performed by student group)*

The research approach is best characterized as constructive research. Data on employee introduction was collected about present ways of introducing new employees through three interviews. Simultaneously three tools were discovered from the researchers and his instructor's previous experience that would provide a concrete means to transfer implicit knowledge to new employees. These tools were tested informally and were found appropriate. They were further refined through discussions with HR-managers about implementing them as part of the employee introduction process.

In the area of electronic workspaces information was first gathered through a web-questionnaire. 60 answers were received and analyzed. Five people were selected for a workshop on making use of knowledge based on their expertise and

this information. The aim of this workshop was to design practices for sharing "unshared" knowledge through electronic workspaces and to design ways how these practices should be widely brought into use inside the organization. The research method in this instance was engaging the collective expertise and experience of the group for generating ideas.

Virtual team practices were studied through four interviews with people experienced with virtual teams. These were analyzed and summarized together.

External knowledge gathering was carried out in other companies with the help of four students, who received interview questions designed by the researcher. The interviewees were arranged by the researcher through contacts from company and by the supervising professor. The companies were selected on the basis of having similarities in their operating environment and being all in a knowledge-intensive field of business. This enabled the companies to identify with one another enough for the results to be generalizable. The research method here was also loosely structured interviews. There were questions for each of the five research areas. The interviews were performed in pairs, with two students interviewing one person at a time.

6.4 Analysis methods

The interviews were analyzed in the following way. From all interviews analyzed, key words and phrases were written down under each question. This was done in some cases during the interview and in some cases while listening to the interviews on tape. All interviews were taped to provide backup information. The information was organized inside mind maps for categorizing answers and summarizing each area of interviews.

The open questions of the Web-questionnaire were analyzed using content analysis in a similar fashion to the interviews. The main difference was that the key words and phrases were the exact text inputs written by the people who answered the questionnaire. The results of the workshop on designing practices for knowledge sharing in electronic workspaces were analyzed through the integral framework presented in chapter 3.1. The resulting concepts were first written down and then components were recognized that correspond to the framework.

The information gathered in external knowledge gathering was analyzed similarly to analyzing the interviews. The differences were the number of people doing the

analysis and the tool used for the analysis; the research group used a word processor instead of mind maps for summarizing and thematizing the information.

6.5 Performing the study

This section describes how the study was implemented. Rather than the describing the formal process or phases, the focus here is more story like, describing events in order as they have occurred.

This work has been more like an ongoing process than a predefined project. This means that there was no fully defined plan from beginning to end according to which the information was to be gathered and processed, but rather a dynamic and constantly updated "manuscript" according to which the work progressed. This was partly because by not having too rigid plans the researcher was able to adjust them more easily based on new information and the conditions at hand, and partly because of a need to deal with a high amount of ambiguity at the beginning of this research.

The work began with a pre-study, which was carried out in a month. Initial plans were made for connecting the study to ongoing knowledge sharing and competence projects within the organization. However, it was decided by the project guidance group to focus on designing practices for sharing and harnessing tacit knowledge independently of the projects already going on. This called for a re-orientation based on this new objective.

Different means to transfer and utilize tacit knowledge were examined and matched against the business needs and context of the organization. Eventually five topic areas were selected for the project and they were made concrete. This re-orientation lasted somewhere from two weeks to a month. New distinctions were noticed every other week and ways and the desired results gradually became more and more specific. It was as if new layers of abstraction were peeled off every other week, each time getting closer to the core of what this research was all about.

A student group was available for gathering knowledge from external organizations. A framework for gathering knowledge was designed based on the selected topic areas and the student group was initiated into the project. The knowledge gathering framework was designed at the same time as selected topic areas were being clarified. Designing the framework effectively forced to clarify and communicate each of the research areas.

Three other companies and one internal department were recruited for participation in external gathering of knowledge. After the first interview a need was noticed to go over the framework with the student group in depth, because of initial fuzziness about tacit knowledge. After that, some work was still to be done in arranging right people from remaining companies to be interviewed.

Written plans with details on working on each of the areas were put together when the student group had fully got up to speed in the second week of March. A big part of work up until then had been defining the areas of work. The researcher later found out, that defining concrete actions for work to be done in each research area still remained.

The research topic of newcomer introduction was selected first. The interviews provided information about the present state of introduction practices, which varied considerably from place to place.

Both the researcher and one of his supervisors in the company noticed that they have used tools that are appropriate for transferring tacit knowledge in introducing newcomers, in other areas. These tools were tested informally and were found functional. Based on these tools, the background information gathered from interviews and the understandings from literature, practices for newcomer introduction were designed and informally tested the organization. Of the areas, new employee introduction has received the most attention. The tools have had a longer time to evolve than others, because after being “ready” they were further developed in conversations about implementing them with HR-managers.

A web-based questionnaire was designed in parallel with the interviews. It took about five days to design the contents of the questionnaire, starting from thinking through its purpose and the ways how the gathered information would be used. 60 answers were received from within the unit. The questionnaire was analyzed both quantitatively and qualitatively.

After the web-survey the workshop was designed that focused on using electronic workspaces from the tacit knowledge sharing perspective. As the subjects were two abstract things as tacit knowledge and electronic workspaces, it took almost a week to understand the concepts together, set smart goals for the workshop and design a process for reaching them during the workshop. Conversations with other people were of invaluable help in designing the workshop. In a workshop setting

it's not enough to self understand the concepts; one also needs to communicate them to others.

The workshop and the people there produced very good high-level input. The workshop notes were analyzed not immediately, but after a period of time (because of other demands) and this gave rise to the high-level concepts for having people naturally want to share their latent knowledge through electronic means.

The third steering group meeting was held after the workshop. The practices for the introduction area were already presented. An assignment was received to find out through what process these would best be brought into use. This was both interesting and rewarding - how to actually get the designed processes into use in the corporation.

After the steering group in the middle of May most of the work focused on virtual teams. This meant navigating the organization for finding the right people to be interviewed, designing the right questions, and performing and analyzing the interviews. The tasks on electronic workspaces and virtual teams topic areas were defined in general terms ("study how to use electronic workspaces well, focus on making use of tacit knowledge") so work was needed to think and define what those meant as actionable and specific actions and outcomes.

In the area of virtual teams the researcher tried an approach for knowledge gathering using a tool that was originally designed for assessing executive leadership. This tool takes a wide range of significant things into account in the cultural, intentional, behavioural as well as systemic domains. However it was found too theoretical and complex to be applied. Building a tool from this framework was discontinued because of limited time and the factors mentioned above.

A decision was made to create separate documents for the results that are most valuable and practical for the company. The company's results were focused around what is useful to be applied and how it should be done, what decisions are needed. The results for the company were delivered at the end of the 6 month contract for the thesis. At that time, the thesis itself was 20% written, but the thought-work that had produced the results had already been done. The thesis itself was ready at the end of July, and it was revised based on comments from the supervising professor in the middle of August.

The study was conducted and all the material was gathered in Finnish language. The ideas were organized and structure of the thesis was outlined mostly in Finnish. All of the deep content was first processed in the researcher's native language down to an outline of paragraphs and then written in English. This is in order to have minimal distortion of content through translation and maximum depth through utilizing the researcher's native language right down to where ideas were ripe enough to be expressed in English. Working with the researcher’s native language was important especially in the initial phases of the study.

7 Results

This section summarizes the results of data gathered in the three main research areas of new employee introduction, virtual teams and electronic workspaces.

7.1 Pre-study of organization

The purpose of the pre-study was to get an understanding of knowledge sharing in the organization and also to help focus the later research. Challenges and best practices also were gathered during the interviews. The people being interviewed during the pre-study were competence managers and other key people regarding knowledge sharing. As a result the researcher was able to form a picture of the maturity of knowledge sharing within the organization and found three projects which this thesis work could be plugged into.

The person for whom this research was conducted guided the research to focus independently of ongoing projects in the organization. The research's areas of focus were not founded on ongoing projects in the organization, but rather on the organization's common and pervasive needs. It then took additional time to re-focus the study objectives.

Since choosing the focus areas was not based on the interview data, a portion of the data was analyzed scientifically. The background understanding of context and organization’s state is presented in the previous section on research environment and has proven to be valuable during the further research.

The focus areas for this research were chosen based on the available means for transferring tacit knowledge and the organizations related business needs.

7.2 Harnessing tacit knowledge in new employee introduction

7.2.1 Present situation

Information about the present situation was gathered through three interviews. The focus was how the training of new employees was handled at the time of study in different sub-units. Three different interviews were conducted. The interviews were by nature conversational and loosely structured within the questions' framework. Some of the questions are based on work done on training on the job by Robert Dilts [Dilts, 1998]. The interview questions are available as appendix IV.

The existing introduction process focused on the administrative tasks of employee initiation, rather than systematics of training the professional skills and understandings new employees would need. The information content included various predesigned presentations that the newcomers would need to hear. Tacit knowledge was in the process through specifying a few key people the newcomer should meet. However, if these people are to give presentations they have most likely developed routines for presenting the same slides of information to newcomers. If presenting information is highly routinized, there is little likelihood of tacit knowledge being accessed.

There was an introduction day where new employees from various countries were flown together to meet each other. This helped create the "feel" of an international organization and to know what the company people in other countries are like. Besides the formal process, the methods of introducing newcomers varied considerably from "learning to swim by being dropped off the peer" to an incubation period lasting several weeks. Mainly there seemed to be a "learning by getting to work" –approach to learning.

7.2.2 Developing practices

Information was also gathered from the personal experiences of the researcher and his instructor at the company. This experience and the literature turned out to be the most influential sources in developing the practices for using tacit knowledge in new employee introduction. These were incrementally refined and at the same time informally verified through low-scale piloting and experimentation. The resulting instructions are the most concrete results of the work done and well-suited for creating an experience for understanding what tacit knowledge is about.

7.2.3 Practices for making use of tacit knowledge

The resulting instructions for using tacit knowledge in new employee introduction are available as appendix I. These consist of using a conversational framework for sharing knowledge in tacit form, and of making tacit knowledge explicit using a social network map and personal role map. The tools are presented as an appendix because they are in the form of instructions rather than knowledge in the form of abstract generalizations (or "episteme") which are more appropriate for presenting in a scientific thesis.

7.3 Harnessing tacit knowledge through electronic workspaces

The results to this area of research are presented in three sub-chapters. First, results of a web-questionnaire about using interaction technology are presented. Second, a workshop for designing knowledge-sharing practices is described. Third, the results of this workshop are examined through the integral framework.

7.3.1 Web-questionnaire

Information was first gathered through a structured web-questionnaire for which answers from 60 people were received. The questionnaire's focus was on know-how the unit's employees already had regarding the use of interaction technology. An assumption was made that most employees are already using the tools of interaction technology that are available for example publicly on the Internet. The respondents were asked what tools they typically use and how they think these tools could be used to benefit the company. The survey was carried out and answered in Finnish and all information presented has been translated into English. What follows is a summary of the results.

The communications tools most found to be good in private lives were wikipedia (97%), instant messaging (92%), video-on-demand services (87%) and reading blogs (72%).

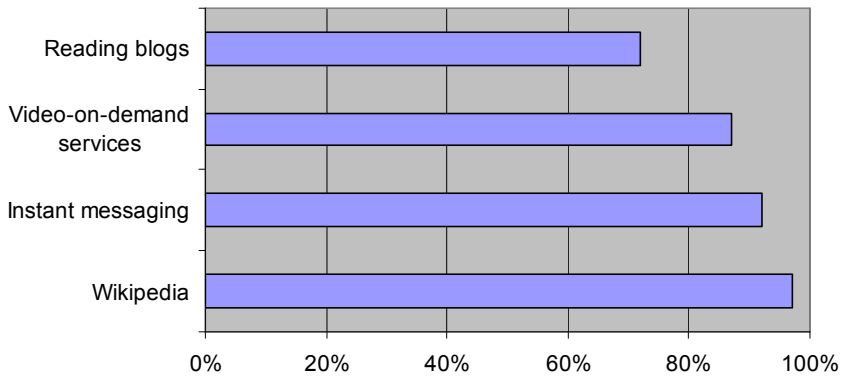

Figure 11 Tools of interaction technology found useful in private lives (Top 4).

Of the tools they found good, survey participants were asked to select top three for use in the organization. Here, the most recommended tools were instant messaging (by 61%), wiki (49%), VoIP / video calls (37%) and blogs (31% for both reading and writing). The rest of the tools were recommended by less than 21% of the respondents. The ratings are lower for these recommended tools because

people were asked to select only top three instead of every tool they found appropriate. None of the tools surveyed was left completely without a recommendation. The full numerical results as well as the survey's open questions are available as appendix VI.

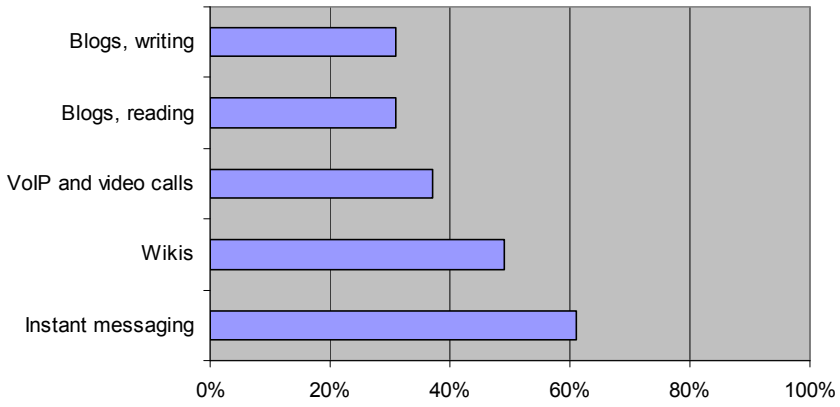

Figure 12 Tools recommended for use to benefit the organization.

Several uses were recommended for the tools. These include sharing knowledge, reducing e-mail overload, networking, and, finding, refining and making relevant knowledge available for the community. Some more specific uses were also suggested, such as blogging entries into an electronic service book for applications under maintenance contracts. The survey also contained an open question about bringing the tools into use. The following paragraph summarizes the answers to this question.

Cultural factors were emphasized, such as promoting respect and appreciation towards those who take time to advise colleagues in the use of communications tools. Another category of answers centered on increasing awareness about the tools and benefits at work that could be achieved by them. These include pilot groups, work-related use practices and success stories.

Making the tools easily accessible was emphasized as well. It's not enough to have them available on request; they need to be as easily available as the office productivity tools like word processor, e-mail or the local intranet front page. It seems that ease of use has important subtleties, and it is exactly these subtleties that make the difference between tool adoption and not taking it into use (from the accessibility standpoint only).

7.3.2 Workshop on knowledge sharing

A workshop was held after the questionnaire on creating practices for knowledge sharing through interaction technology. The workshop focused on sharing latent knowledge, the kind that is available to a person seeing a situation he has experience about but which, for some reason, is not shared with the group that is in the situation.

An example of latent knowledge could be not making a comment, which the person knows would give valuable information to the group, into another group's electronic workspace while visiting it. Reasons for leaving it out could include there being no *really easy*, visible way to leave the comment or because of other interests, such as wanting to keep specialized knowledge to oneself.

Five participants were selected based on their knowledge and expertise about the subject. These people included developmental managers for the internal knowledge sharing platform and cross-border competence sharing efforts, as well as a change management consultant and two consultants.

The core questions of the workshop were:

1. What will be best practices for utilizing people's latent knowledge through electronic workspaces?
2. How will these be taken into use starting from present situation?

In essence, the assignment was to brainstorm and create practices for the use and sharing of valuable knowledge in people, in the context of electronic workspaces and interaction technology.

The workshop produced high-level concepts for having people share latent knowledge on own initiave. Enabling intrinsic motivation was considered important because there is no way to really tell from the outside, how much valuable knowledge a person really would have to share. These concepts were later processed through the integral framework presented in chapter 3.1 to understand the cultural, intentional, systemic, and behavioural influences on knowledge sharing and taking the created concepts into use.

The concepts are managing information's maturity and lifecycle, knowledge sharing being built-in to the processes of everyday work, mechanisms for recognizing knowledge contributors, and workspace structures supporting

conversations around pieces of knowledge. These are presented next and analyzed through the integral framework.

7.3.3 Concepts for enabling knowledge sharing through electronic workspaces

When knowledge is stored in an electronic workspace, is saved as explicit. Most of sharing knowledge through electronic workspaces is about explicating tacit knowledge and providing appropriate mechanisms for combination. Concepts are presented here to enable intrinsic motivation for sharing knowledge in electronic workspaces. The concepts are analyzed through the integral framework presented in chapter 4.5.

Latent (or "unshared") knowledge can be concrete, such as a PowerPoint-presentation for personal use with own customer, or less explicit, such as experience about an earlier project that could be shared through comments when seeing a similar situation. Another example could be a personal view on status of a project at the grass-roots level, expressed through a metaphor in a cafeteria or a "virtual water-cooler" environment. "This project feels like were sailing in a ship without a compass", or, "I feel we all can see the land now clearly in sight".

Let's get back to the integral framework for a moment, as it is the main tool for analyzing the concepts.

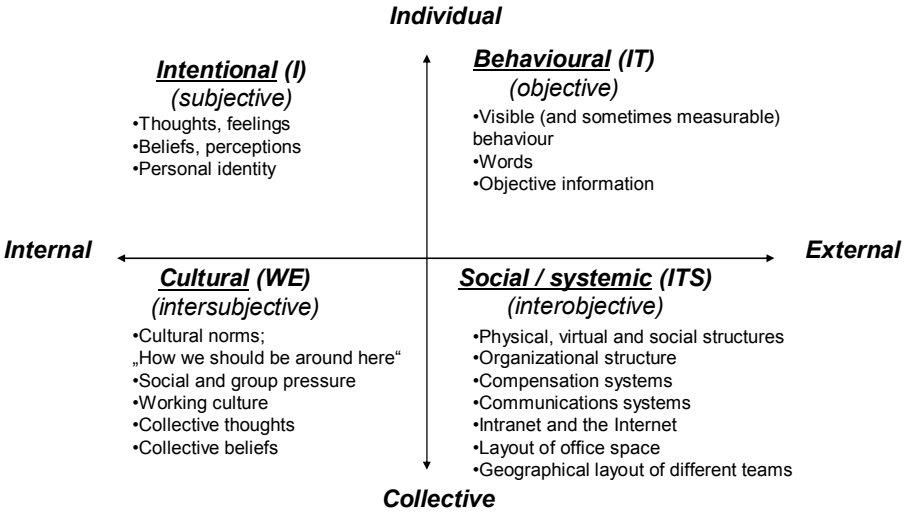

Figure 13 Integral framework applied to operating in an organization.

The structure of virtual workspaces belongs to the systemic category. The concepts are presented next while highlighting their intentional, behavioural,

cultural and systemic factors. It is important to note that the following concepts were created in the workshop and are analyzed with the above framework, instead of having been created by thinking through the framework itself.

Information maturity and lifecycle management

Sharing of incomplete knowledge at the moment is mostly based on interpersonal trust *(cultural)*. Through e-mail, information is shared to the network of trusted colleagues *(behavioural)*. Information is given to those, who are trusted to use it in a way that will take the person sharing the knowledge into account and does not hurt his interests *(intentional)*. This trust for using the knowledge "right" should be expanded to be present in the virtual environment *(cultural, systemic)* in order to enable the motivation for knowledge sharing to transfer from closed groups to more openly accessible electronic workspaces.

First, a safe place should be provided for sharing informal and incomplete knowledge and ideas *(systemic, cultural)*. Different workspaces can be compared to different type of performance arenas; The "Hartwall Arena" is where the well-rehearsed Eurovision songs are presented. In the knowledge-work context, these correspond to materials well prepared for public company distribution. The "band rehearsal garage", instead, is for practicing. Rehearsing new songs would become rather difficult if the performer would perceive, because of the nature of the rehearsal space, that there's an audience around him expecting professionally rehearsed performances *(cultural)*. Providing this safe place could be done by pointing out an electronic workspace environment for refining and developing incomplete knowledge *(systemic)*. Further, if the knowledge shared through this environment were permanently watermarked as belonging to this environment, more comfort for knowledge-sharing could be expected *(systemic, intentional)*.

In order to create trust, there should also be commonly-agreed-upon practices for using incomplete knowledge along it's lifecycle from ideas to public distribution *(systemic)*. The information's maturity level should be embedded in it to be able to track that the information is used appropriately *(systemic)*.

Embeddedess inside of everyday work processes

Sharing knowledge is easily perceived as an extra task *(intentional)*, especially if it first needs to be converted to electronic form. People often perceive that the knowledge put together should be polished and finalized *(intentional)*.

Instead of this paying attention to going through this effort, knowledge should be shared by-default when it is stored *(systemic)*. To not share it should be an extra activity. In addition to the tools being easy-to-use, knowledge sharing should be embedded into the processes of everyday work instead of requiring additional efforts *(systemic)*. The additional efforts are caused for example from packaging the information (behavioural), needing to use different tools *(systemic)*, as well as perceiving the need to finalize what is being shared *(cultural)*.

The tools should be used in such ways that the information created is available to others *(behavioural)*. This can be valuable for the person sharing *(intentional)* because of comments from colleagues *(behavioural)*. The first step could be making the nature of electronic workspaces open by default *(systemic)*. The extra effort would then be to limit access when needed. Since limiting access is usually a must *(systemic)* in the situations where it is needed, there is no need to worry about it not being done. The next step could be to hook in a mechanism for easily commenting and reviewing comments for each piece of information *(systemic)*.

An individual should benefit *(intentional)* from sharing his knowledge *(behavioural)*. Mechanisms for recognizing contributors, such as name visibility and showcasing best pieces of information would be of benefit *(systemic)*. An example of a possible implementation could be moving conversations around offering and concept creation to (personal or topic-related) blogs. This would enable linking, tracking post popularity, and name visibility. Most importantly, anybody could join the conversations.

Mechanisms for acknowledging knowledge contributors

Sharing knowledge should be rewarded. If the person doesn't perceive benefit from "extra" knowledge sharing but perceives it as an additional task for an already-busy day instead *(intentional)*, the person will share his latent knowledge *(behavioural)* only in individual cases, mostly where there are external requests or orders *(behavioural)*.

One of the best rewards is recognizing their contribution *(cultural, intentional, systemic)*. When contributing knowledge, the contributor's name should be visible *(systemic)*.

In addition to name visibility a mechanism is needed for easily commenting on the original knowledge *(systemic)*. In the normal case, a finished piece of information contains only the name of its main creator(s) who are the ones to receive the

acknowledgement as well *(systemic, cultural)*. The history of revisions, or intermediate stages of the creation of the information, should also be documented automatically (systemic). This way others can learn from the process of producing the outcome instead of only seeing the results. Wikis, for example, contain parts of this functionality.

Other, more market-driven mechanisms for this context could be following "viewer statistics", a list for most-read articles of the week, and an Amazon-style feedback function on usefulness from people using the information *(systemic)*.

Electronic workspace encourages conversation around information items

In order to have "life" in electronic workspaces, workspaces as an organization-centred knowledge-repository are not sufficient. Movement, or interaction needs to be created in the workspaces *(systemic, cultural, behavioural)*. Especially if creating a rendezvous-place, a "virtual water-cooler", is desired, conversation-encouraging structures in electronic workspaces are needed *(systemic)*. A beginning for these could be encouraging workspace titles, such as a "What's up" –section in project space and "Who knows"-columns hooked up to different areas *(cultural, systemic)*. Also, the workspace could request comments discreetly *(systemic)* by providing a well-visible space for writing them and sending them in by one click. If the users need to look for how to start a conversation, starting it is not easy enough (*systemic, intentional)*. This concept of encouraging conversation was not from the workshop itself, but was developed later in conversations with some of the people involved in the workshop.

It can be noted that cultural and intentional factors are emphasized in these concepts. The researcher suggests using the structure of the electronic workspace as a permeating means to affect these factors. All of these concepts contain qualitative requirements for the structure of electronic workspaces. Fulfilling these requirements can lead to electronic workspaces that are well-suited for being "virtual water-coolers", and places for informal knowledge sharing.

In addition to these high-level concepts, concrete actions were examined that would help bring these concepts into use. These include gathering and promoting "how to use"-concepts, making the benefits of virtual knowledge sharing visible through success stories, pointing out a space for sharing incomplete ideas and piloting new practices with an initial group to verify their benefits in an organization.

7.4 Using tacit knowledge in virtual teams

Information about the present situation was gathered through interviews with four people who have experience with virtual teams. Two of these were leaders of competency areas, one person was a leader in a virtual team and one was a member of a naturally distributed team that provides executive consulting services. The interview framework was put together around the core questions of "What are good learnings for virtual teams" and "What competencies are important while operating in virtual teams.

7.4.1 Designing practices

The interviews were then analysed and a structure for a virtual team leader's guidebook was created with things a virtual team leader should know. Some of the things were completed and some were left for completion outside of this thesis work because time was available for carrying out only four interviews. The interview questions are available in appendix V.

Besides the interviews another framework was briefly tested. This was a framework for gathering information relevant for executive leadership [Volkmann, 2005]. The framework is based on the integral model presented in chapter 4.5. The approach was tested because it gathers information about a multi-dimensional whole and was thought to benefit virtual teams with multiple stakeholders pretty well. The feedback received from testing was that it's too theoretical in order to yet have much practical value. There was not enough time available to simplify the framework to its essence and to organizational culture so pursuing this framework was discontinued within the thesis and it was suggested as a possible spin-off project.

7.4.2 Results

The main learnings from the interviews are as follows. It is important to take care of the virtual team members' sharing a common understanding of what they are out to accomplish together. The importance was stressed for team members also to be "ideologically on the same level". What working in virtual teams was about was considered to be creating common understanding and "we-spirit", networking, and communicating. The tasks and responsibilities need to be especially clear in this working environment. Ways of working need to be compatible so the results can be put together. This also makes tracking tasks and their progress much easier.

Understanding communications tools and using them effectively was found important. Different tools are suitable for different situations. For example, there isn't much wisdom in asking questions in e-mail that would cause a need for asking many further questions. For such situations real-time communication is well suited. On the other hand, a video call can be disturbing while jointly editing the same document or when trying to look up relevant information from a chain of messages.

Some easily implementable practices came up, such as daily 10 minute video calls going through the following questions: 1) What have I done yesterday? 2) What am I going to do today? 3) Is something preventing doing my work? Other examples include having a clear leader for the team and storing the communication instead of e-mail into a common virtual workspace.

7.5 Gathering information from external companies

Information on the research areas was gathered also by external interviews in other companies. This information augmented the research done within the company. The interviews were carried out by a group of students on a course run by the professor supervising this thesis. One of the companies interviewed was another unit of the company for which this research was conducted. There are people from different areas for each company so the results give more of an overview than information that is comparable between the companies. There have been 13 external interviews carried out altogether with 13 people in four companies. The companies are referred to as companies A, B, C, and D.

This information gathering framework was created at the time of getting clear about topic areas for the research. Creating the framework was the first assignment after the pre-study and deciding the topic areas for the research. The information gathering framework and interview questions were provided by the researcher. The benchmarking study was carried out by four students, whose names are listed in the acknowledgements part of this thesis. Names of the companies and an overview of the interview framework are presented in appendix II. What follows is a summary of the results.

Introduction was seen to be beneficial in all four companies. The usefulness of the new employee for the organization develops faster than without it. Monitoring progress of the introduction was found useful (A). Usually this monitoring was based on the subjective experience of a person and not through numbers.

Mentoring was also used in all four companies. Learning by doing was considered important (B). On the other hand when learning by doing one doesn't really think about transferring tacit knowledge, it happens as a side-product of learning.

When a virtual team contains members who don't know each other it's good for the team to meet face-to-face before starting to work on the project (B). Instead of discussing work it's good to discuss also doing the work (B). Trust is created from knowing the other team members and from seeing they do their own parts in the project (B, C). Experiences of success help team members get to know and trust each other. The working culture should make sharing knowledge safe (B). Someone needs to have responsibility for each part, fully shared responsibility doesn't exist. Virtual teams were thought to provide new contacts, new viewpoints, and they were believed to make utilizing the knowledge of an organization more efficient.

The group using an electronic workspace should be able to customize it according to its needs. It's interesting to notice that often the senior members have the most trouble in using electronic workspaces while they are most likely the people with the most knowledge to share. The ease of use and adoption of the workspaces was emphasized (B, D, A). Good examples create interest; it's important to show that something really works (B). Sharing knowledge should be able to benefit the contributor's career and status in the organization (A). A workspace can, for example, track whose knowledge is being accessed the most (A). In electronic workspaces tacit knowledge was considered to be shared through user comments that relate to formal and structured information. These comments should remain linked to the original information and be further refinable by others.

8 Discussion and conclusions

The purpose of this study was to examine designing best practices for using tacit knowledge in a knowledge work environment. This chapter discusses the empirical results in light of the literature review of the first chapters. Answers are provided to the research questions:

1. *What is tacit knowledge?*
2. *What are the best practices for making use of tacit knowledge in a knowledge work environment?*
3. *What are key issues to be taken into account when introducing these practices in a knowledge work corporation?*

At the end o this chapter there is an evaluation of research methods, as well as suggestions for further research.

8.1 Tacit knowledge in research areas

When developing the practices and doing interviews during research, tacit knowledge was encountered empirically in following forms in the research areas. These are then discussed in light of theory.

The dominant forms of tacit knowledge in the area of new employee introduction had to do with mindset, becoming aware of implicit job-related skills, and cultural capital. These were noticed in the form of high-level expectations, concrete examples, knowing people, and stories about current and past situations. Already existing ways of sharing these within the organization were for example case stories, as well as international introduction days where people from several countries come together to get to know each other.

The following examples come from the “unofficial” testing of tools designed for transferring tacit knowledge to new employees. These are in the form of implicit knowledge. This kind of knowledge can usually be expressed simply, but it needs to be internalized before it starts providing a person its benefits.

- The most significant skills of a project manager were not found to be mastery in the formal project management methodologies, but in adapting and dealing with change.
- A mental model of a salesperson: Instead of selling to people, he is “helping his customers find solutions”.

- A significant skill for a consultant was found to be the ability to quickly see connections between projects and appropriate business cases for his customers.

In the area of virtual teams the most dominant forms of tacit knowledge encountered were found to be understanding tasks and outcomes similarly between team members as well as knowing how and when to communicate. Being "ideologically on the same level" enough to understand tasks similarly is a pre-requirement for the team having compatible ways of working and being able to put together the results of each individual's work. If there are instructions for something, tacit and implicit knowledge lie in applying these instructions.

In electronic workspaces, tacit knowledge was identified most characteristically in the following forms:

- Mostly latent, or, "unshared knowledge", that is either explicated and unshared or not yet explicated.
- In text form, tacit knowledge can be found in what is said indirectly, "between the lines".
- If video is used, non-verbal gestures, emphasis, and tone of voice carry information about what is said.

This supports the theoretical part, where usefulness of electronic workspaces was identified mainly for knowledge explication and combination.

The practices and concepts designed in all areas deal mainly with implicit knowledge, as illustrated in Figure 14. Deeply tacit knowledge was accessed as a side-product of accessing implicit knowledge.

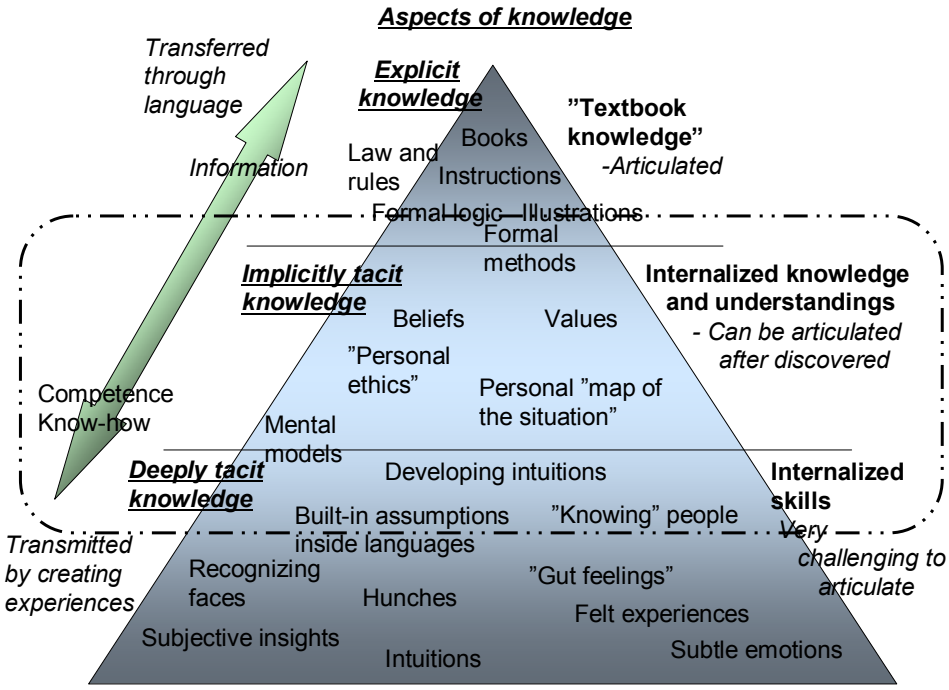

Figure 14 Aspects of knowledge covered in designing practices during this research.

According to the literature review tacit knowledge is know-how that is developed through experience. It comes in the form of skills and mindset, along with the related experiences. This includes, for example, skills acquired through cultural transmission or personal experience. Tacit and implicit knowledge come in several forms, including:

- Mental Models (how things really work, models of the world, assumptions) [Senge et Al., 1994].
- Know-how of the body (performing skills like swimming or carpenting) [Polanyi, 1966].
- Tacit knowledge in feeling, a "Gut sense" of intuitions in situations.
- Social knowledge (phronesis), practical and social wisdom [Baumard, 1999].
- Wits and cunning (metis) in situations where established rules do not apply [Baumard, 1999].

When comparing these with the above findings mental models were accessed most clearly of the above. Some sharing of mental models was captured explicitly like surfacing the salesperson's mental model of helping his customer find solutions and the consultant's guiding thoughts on connecting business cases to projects.

Social knowledge was also accessed by asking how different groups perceive themselves (Appendix I).

It should be noted that the researcher had the above theoretical understanding of tacit knowledge before conducting the empirical research. This understanding might have focused the researcher's attention to primarily notice these things, possibly leaving out other perspectives.

8.1.1 Significance of tacit knowledge

It has been researched in communication that words themselves make up 7% of communication. The following estimates are from [Mehrabian, Ferris, 1967] as referenced by [Clark, 1997].

- 55% of the content from the visual component
- 38% from the auditory component
- 7% from language

Roughly one-third of the message is carried through voice tone, tempo and other auditory qualities which the receiver interprets. The rest - more than 50% of the meaning a communication receives - is carried by body language, proximity, nature of the situation etc. The researcher makes an assertion that in the transfer of knowledge, which essentially is the transfer of meaning, the same rules apply. *How something is said gives meaning to "the what" is said.* This is especially true of emotions – a sarcastic tone of voice, for example, can flip the meaning of the message upside down.

What is not said but communicated otherwise will most likely contain tacit understandings related to the task at hand or skill being explored. Most of non-verbal language a person will not be aware he is communicating. And, like with receiving communication through body language, the receiving person will pick up many of these cues without them coming directly into his conscious attention, but still influencing the message he receives.

8.2 Practices for using tacit knowledge

This section answers the question of best practices for making use of tacit knowledge from the empirical and theoretical perspectives. Different levels of maturity were reached in designing practices for each of the research areas. The highest maturity level was reached in the area of new employee introduction. The most central findings are presented here.

Tacit knowledge is being transmitted all the time. The researcher noticed that when dealing with tacit knowledge systematically, the first thing needed is an awareness of it, being able to notice it.

People learn (for example about culture, ways of working and about other people) whether they notice their learning or not. It's not the learning that is difficult, it's the understanding of what, exactly, happens and directing it consciously and systematically that was found challenging. For example, making the recorded information explicit that was transferred conversationally during one hour of going through the tacit knowledge sharing perspectives –framework (described in Appendix I) and condensing it had taken more than two days' time from the researcher.

New employee introduction –practices were ready for piloting after the research. The practices for introducing newcomers deal mainly with implicit knowledge, the kind that can be articulated by asking the right questions. The recommended introduction practices contain the following tools: Social network mapping (tacit-to-explicit), building a personal role map (tacit-to-explicit) and a conversational framework of tacit knowledge sharing perspectives (tacit-to-tacit).

In the area of electronic workspaces high-level concepts were created, which focused on enabling intrinsic motivation for knowledge sharing (explication and combination), embedding the process of knowledge sharing inside of work and enabling interpersonal trust to be adopted in open virtual environments. These are described in detail in chapter 7.3.3. Any practices that will be adopted should support implementing these understandings.

In virtual teams it was found central to have real-time communication repeatedly, preferably in short sessions. It was found better to check the direction briefly and often than to hold long meetings once a month. Having a clear leader, having a shared understanding of work and ways of working, and team members having met face-to-face was considered important. Although not tested, the researcher suggests the tacit side of building shared understanding of work and ways of working can be facilitated with the tools designed for employee introduction.

There are four modes of transferring knowledge. These are combination (from explicit knowledge to new explicit knowledge, like putting together a product manual), externalization (from tacit to explicit knowledge, an example would be concept creation), internalization (from explicit to tacit knowledge, learning by

doing) and socialization (from one person's tacit to another person's tacit knowledge, like adopting the working culture of a new organization). Practices dealing with tacit knowledge thus need to contain elements of socialization, externalization and internalization.

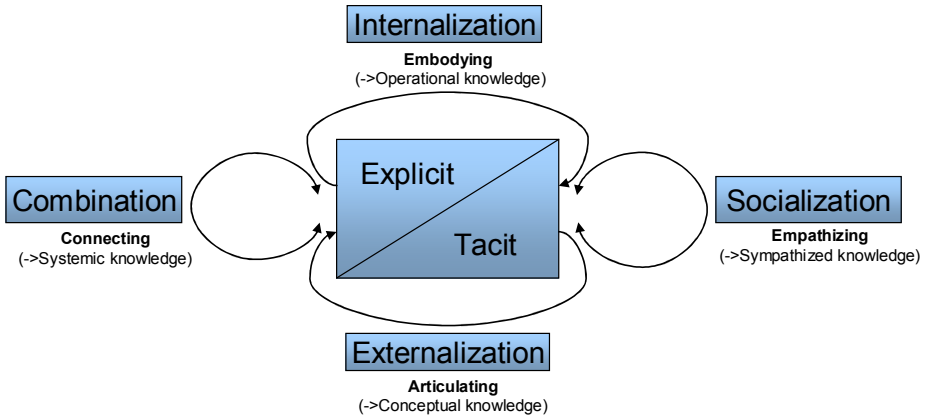

Figure 15 Model of Organizational knowledge creation [Nonaka et Al., 1995]

Of these, socialization and explication were most used in the designed employee introduction practices. Electronic workspaces –research produced mainly concepts for enabling better explication and combination. The resulting principles from virtual teams –research seem to spread the most evenly across the above modes of knowledge creation.

There are several ways and methods of transferring tacit knowledge. Methods include communities of practice, apprenticeship, organizational storytelling, mentoring, rotation of assignments and, modelling of skills and mindset. These are presented in chapter 3.5 in more detail.

When there is little externalization, the methods transfer knowledge from tacit-to-tacit knowledge and rely highly on socialization. The person will be able to perform the action or use the understanding learned in relevant situations, but may not be able to well articulate it.

The methods that rely heavily on externalization rely on making tacit knowledge explicit. This has the advantage of being able to distribute multiple copies of the explicit form through books or communication technology, and to critique it more openly. The disadvantage is that on the way to becoming explicit, by necessity, a portion of the original knowledge, has to be left unexpressed. These cannot be made explicit in and of themselves, but instructions for having similar experiences necessary for developing them can be developed in explicit form.

Sveiby summarizes knowledge management as having two tracks; the IT-track and the People-track. The IT-track is about information, treating knowledge as an object. The People-track is about skills and competencies, treating knowledge as a process. [Sveiby, 2001]

Table 8 Briefly summarizing levels of knowledge management. [Sveiby, 2001]

	Knowledge management	
Track/Level	IT-Track	People-Track
	Knowledge = Object	*Knowledge = Process*
Organization level	*"Re-engineers"*	*"Organization theorists"*
Individual level	*"AI-specialists"*	*"Psychologists"*
	"E-specialists"	

Tacit knowledge is most definitely knowledge as a process, a people-track phenomenon. The researcher would suggest bringing people-track –thinking into electronic knowledge sharing environments. Treating knowledge as a process enables its evolution. Instead of simply storing knowledge, the electronic environment should be used and designed as a new platform for conversations.

8.3 Key issues when introducing practices in the research areas

This section summarizes what needs to be taken into account when introducing practices dealing with tacit knowledge.

While examining the concepts created empirically for sharing knowledge in electronic workspaces several factors were noticed. These were analyzed through the integral model presented in chapter 4.5. This model states that of whatever endeavour, both individual and collective, as well as the internal and external viewpoints are relevant and need to be taken into account.

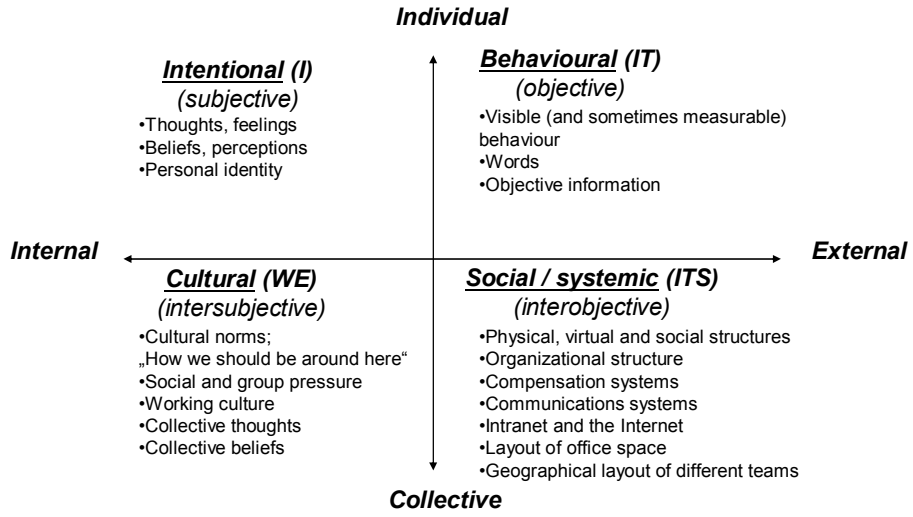

Figure 16 Integral four quadrants applied to operating in an organization.

This model was verified based on the empirical findings from concepts for sharing knowledge through electronic workspaces. All the four types - cultural, intentional, social/systemic and behavioural factors were all found to be of significance. Thus, when implementing practices, the demands of all of these quadrants would need to be acknowledged and "satisfied".

Empirical examples of these are trust that the information will not be misused *(intentional/cultural),* as well as the desire to gain recognition among colleagues *(intentional)*. If the electronic workspace provides a means to share the information *(systemic),* but not to gain recognition *(cultural)* for it or to inspire trust *(intentional)* that the information shared will be used appropriately *(behavioural)*, less information will be shared *(behavioural)* although knowledge sharing it is still technically just as possible *(systemic)* as in the physical workspace. This verifies that the transfer of knowledge depends on not only the features of the electronic workspaces but also on factors related to culture, behaviour and individual interests. The researcher suggests these factors could be generalized for knowledge sharing in general.

These can be summarized as:

- Compatibility with organizational culture
- Compatibility with organizational structures like decision making structures and compensation systems
- Taking the individuals' motivation into account

- Having and following up on concrete things to do.

If a desired new way of working is of enough importance, it may be necessary to make changes for harmonizing the above factors for implementing it successfully. Otherwise what was left out will keep being “in the way”, to some degree or other.

When introducing the practices for introducing new employees it was found essential to integrate them with the existing practices for formal employee introduction. The issues that came up dealt with placing the practices in a larger context, following up on learning, having a point of shifting responsibility from the process to the new employee for continuing his learning, and building in points of verification throughout the introduction process.

Introducing practices for virtual teams were examined the least. Things that came up include creating an atmosphere of trust and making sure communications tools are available and team members know how to use them.

The organizational culture provided a prerequisite for bringing any new practices into use; that they are providing help in dealing with immediate business problems.

According to Nonaka et Al, "the knowledge-creating process cannot be managed in the traditional sense of 'management', which centers on controlling the flow of information. Managers can, however, lead the organization to actively and dynamically create knowledge by providing certain conditions." [Nonaka et Al., 2000]

Key issues here are considered to be setting the knowledge vision, knowing the organization’s knowledge assets, bringing them to interact together, and providing the necessary conditions of trust, care, requisite variety and safety to allow people to openly share their knowledge and their sometimes highly personal insights. Examples of organizational knowledge assets are presented in Table 9. [Nonaka et Al., 2000]

Table 9 Categories of organizational knowledge assets according to [Nonaka et Al., 2000], 16.

Experiential Knowledge Assets Tacit knowledge shared through common experiences • Skills and know-how of individuals • Care, love, trust and security • Energy, passion and tension	**Conceptual Knowledge Assets** Explicit knowledge articulated through images, symbols, and language • Product concepts • Design • Brand Equity
Routine Knowledge Assets Tacit knowledge routinized and embedded in actions and practices • Know-how in daily operations • Organizational routines • Organizational culture	**Systemic Knowledge Assets** Systemized and packaged explicit knowledge • Documents, specifications, manuals • Database • Patents and licences

It is helpful to have several types of "Ba" or places for knowledge creation for different ways of knowledge creation. These include contexts for sharing experiences, negotiating mental models into shared contexts, combining explicit knowledge, and reflecting on knowledge and exercising skills. The different contexts correspond to the ways of knowledge creation of socialization, externalization, combination and internalization.

8.4 Evaluation of research methods

The nature of the study was mostly qualitative and little quantitative data was collected. The total number of interviews that serve as basis for this study has been 30. This is a lot, even if it is distributed across the different areas. Also, special care was taken in selecting and recruiting the most appropriate persons to be interviewed. The constructive research approach used in this study was found appropriate, because it provided the freedom necessary for designing the practices in an ambiguous environment.

The amount of interviews performed by the researcher on research areas was 3 to 4 per area. Some themes were found recurring in these interviews, however with more interviews broader and more accurate information could have been gathered. The method of semi-structured interviews used made gathering focused information possible, although it at the same time influences perspectives taken by the interviewees.

Tacit knowledge as a phenomenon, by definition, is only partly describable in words. This creates challenges to what can be expressed in a written thesis such as this one. In order to know tacit knowledge and not merely know *about it* one

needs to have (or at least recall) experiences of engaging with it. This is a limitation of the methods in paper form for presenting results of this research. As such, going through the exercise of tacit knowledge sharing perspectives (in Appendix I) with a partner will probably teach new a reader with no reference experiences more useful practical knowledge about implicit knowledge than intellectually understanding most of this thesis. Going through the exercise will begin to create personal tacit understandings of what tacit knowledge is. Reading this thesis does give an intellectual understanding about implicit and tacit knowledge, with some documented reference experiences described as stories to draw upon.

Change management is related to implementing new practices in an organization. No in-depth study of change management was made. Especially, the integral theories were not compared to change management literature. However, one of the instructors from the company side was a senior change management consultant.

The external knowledge gathering was conducted by a group of students instructed by the researcher. Some distortion of information may have occurred in these results because of the information having passed through several people's hands. Also, additional dialogue between theoretical and empirical sections of the study could have enriched the research.

8.5 Suggestions for further research

This study has focused on practices for using tacit knowledge in corporations, in a knowledge work environment. Other environments of interest for further research would include education, change management, innovation, and effects on corporate culture and organizational behaviour. Studying the competitive advantage that comes from sharing intellectual capital would be highly of interest as well.

Another area of research could be the implementation and effects of electronic knowledge sharing platforms designed from a tacit knowledge perspective. Creating a knowledge sharing platform that implements the knowledge sharing concepts presented in chapter 6.3.2 could provide a suitable infrastructure for informal organizational knowledge sharing across borders. The benefits and adoption of this should be studied as well.

Innovation is related to the skilful use and combination of both explicit and tacit knowledge. Studying the role of tacit knowledge in innovation would be interesting to understand how making use of tacit knowledge could be of benefit in developing and promoting innovation.

Researching changes in corporations and society that would come from the widespread adoption of a paradigm of knowledge that includes both tacit and explicit would be very interesting. How would our schools function, what new meaning would “lifelong learning” receive? What would be the changes reflecting that in corporate cultures?

The educational system supports learning mainly through combination of knowledge. Explicit knowledge is presented as course materials and part of it is internalized during exercises, lectures and conversations with peers. Then it is combined into a summary during examinations. In most cases, it is the skill of combination that allows students to pass a test. How would the educational system be different if its focus was systematically expanded to include internalization, externalization and socialization as equal modes of learning? What would be the impact of adopting tools and frameworks for making use of tacit knowledge in schools and universities? Another area would be systematical tacit knowledge sharing between universities and companies, and its impact on national competitiveness over the long term. This would be a very interesting area of study.

There’s the area of change management as well. Individuals’ resistance to change comes usually in the form of inexplicitly expressed habits, cultural expectations and other intentional factors. These are not easily visible to the people and management behind the change management programmes. Making factors like this visible could contribute to change management and thus it would be interesting to study the role of making use of tacit knowledge in managing change.

Sharing tacit knowledge comes with a possibility add visibility to individuals’ values and beliefs both to themselves and to the organization. Consequently, the values of employees and the values of their organization may become more in alignment with each other. An interesting area of research might be changes (for example in openness and culture of sharing information) in organizations which take place from the implications of becoming fully aware of tacit knowledge and starting to make use of it to an organizations advantage. Such a paradigm shift

would likely have effects on corporate culture and supporting decision structures as well. Perhaps making use of tacit knowledge would be a natural cause for companies to become learning organizations.

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Appendix I - REALLY introducing newcomers - TOOLS for transferring tacit knowledge in new employee introduction

The current introductory process is based solely on a formal introduction. This is insufficient for quickly internalizing the knowledge necessary and gaining quality, efficiency and employee commitment to purpose. Business benefits will be gained by taking tacit knowledge into use with the tools presented in this document. This document presents a new way of providing introduction with the following three tools: Conversational tacit knowledge sharing perspectives, social network mapping and personal role maps.

Background

There are three kinds of knowledge - knowledge that is expressed, knowledge that can be expressed but isn't for some reason, and knowledge that is very challenging to express or articulate. The expressed knowledge is what we usually think of when referred to knowledge in general. It can be useful to think of the picture above as a continuum between information and skill - or as text, understanding and ability how to do things.

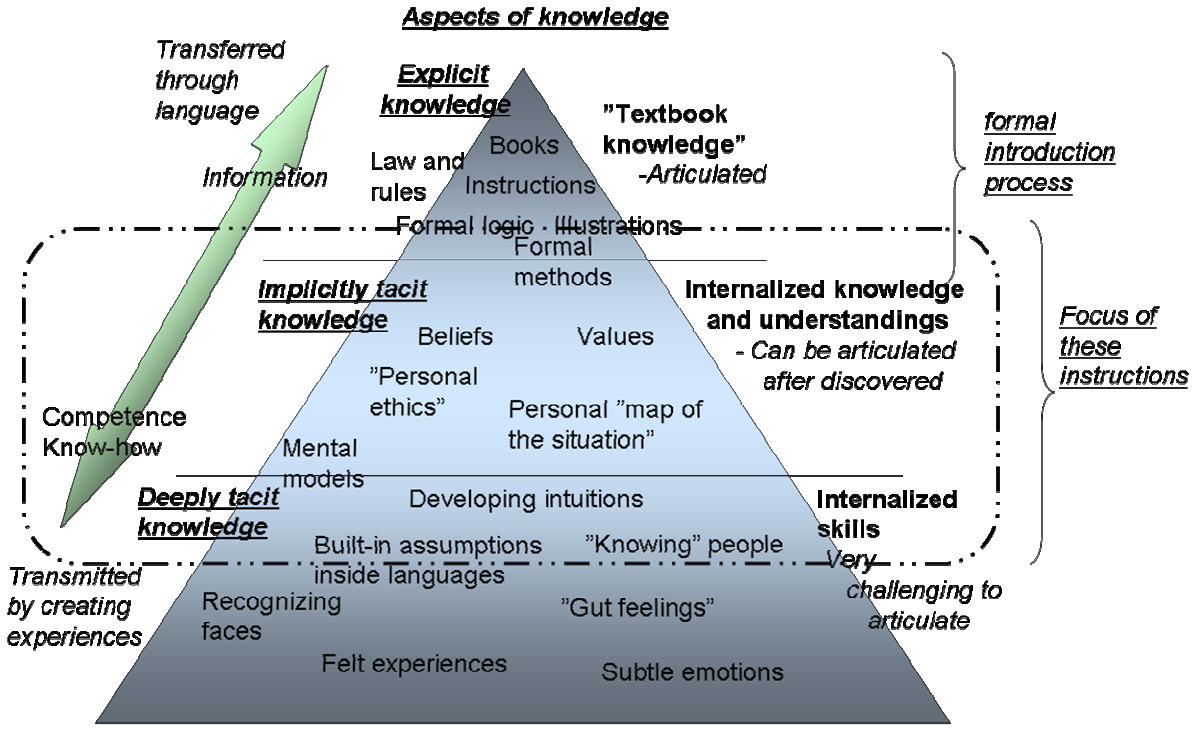


Figure 1 Aspects of knowledge.

Value proposition

"So What?" - what is the value and what are the practical applications? Here are some things that dealing with these kinds of knowledge can be valuable for:

- Enabling shared mental models
- Accelerating internalizing skills
- Enriching transfer of knowledge in business
- Sharing the stakeholders' real (and often implicit) expectations for projects

All of these create both quality and efficiency. The practical applications are there in any situation where you need to communicate understanding. As the picture above describes there's a lot to it but you'll discover it's actually simple to do.

The process in a nutshell

1. **Create a role map for the new employee**. The map describes the person's roles, tasks and responsibilities in a concrete and easily understandable way. This should be done before the employee arrives at the workplace. When he arrives, go through the role map with him and also ask him about his expectations.
2. Create a map of the social network together with the employee and **"walk your newcomer through" the social network.** Explain the different people involved, their roles, knowledge and influential relations. Prioritize - "These are the people most important for you to meet", and let him loose (after the next step). The competence managers and new employee's peers can help in establishing what knowledge the new employee needs from each of the people in the network.
3. Share tacit knowledge with the new employee by **instructing the newcomer to ask you to tell him about the work he will be doing through the tacit knowledge sharing perspectives.** Take an hour at least, reserve half an hour afterwards. This is very good for creating trust, mindset visibility and clarifying high-level expectations. It's also important for the rest of this process that the new employee gets a successful usage experience of the perspectives.
4. **Send him to meet** the **people** he needs to meet, equipped **with the map** as a tool for navigating the network **and the perspectives** as a tool *for bringing efficiency and quality to the interactions.*

The maps can be made fairly easily using mind manager software.

There are several advantages to doing this:

- The **quality of information** transferred
- The **trust** generated, as it creates a feeling of having shared something together when sharing the tacit knowledge you hold implicitly
- This also functions as a re-orientation for experienced people who share their knowledge. They will **reflect on their work** by going through the perspectives and this will bring alignment between beliefs and actions, as

well as bring into awareness skills that might be needed for doing work in the future. It will make experienced people pause to think and reflect.
- The newcomer's "people network" will be formed quickly, **reducing time it takes to realize full productivity**
- Since people share their deep knowledge with the newcomer, the **new person will feel** much **more at home. He will know what is expected of him, how other people already are doing what they do and who to ask.** The organizations mindset becomes transparent to the newcomer.

In other words, this process contributes to bringing better spirit, better working relations, developing a broad "big picture" understanding and to quickly internalizing the knowledge needed in doing the work.

Internalizing of knowledge is more effective when a person communicates things "without a script" than when he has prepared a PowerPoint presentation. This is because instead of perceiving he is getting the "official truth that is being projected on the wall", the newcomer will understand he is receiving "operational truth", the "how it really works around here" and knowledge people doing the job actually use to get it done and what are his own colleagues' mindsets and real expectations.

Credits to people: I have received the mapping concepts from Jorma Lehtinen and the taking perspectives -approach originates from the "logical levels" concept of Robert Dilts.

The Tools

1. Social network map

When a new person starts working, the situation is often confusing. Who are all the people he meets, what do they really do and how do they relate to him and between themselves? What is it exactly that's needed for doing well in the new environment? These kinds of questions are most often unanswered during the introductory coffees.

Many times, the "people map" of his organization and what the colleagues really do remains a mystery for most parts for some months of being on the job. What if we could bring clarity to how people have *unofficially* organized themselves and how their work relates to that of the newcomer?

One tool for this would be describing the social network. This would include information as who are the people most important to your work, how they are connected and keep the people that are important but who you don't really communicate with, in your awareness. This map would also contain connections between people and topics relevant to you that they are working on. When needing information about a particular customer, the newcomer would check his map to see which particular person has knowledge about that one.

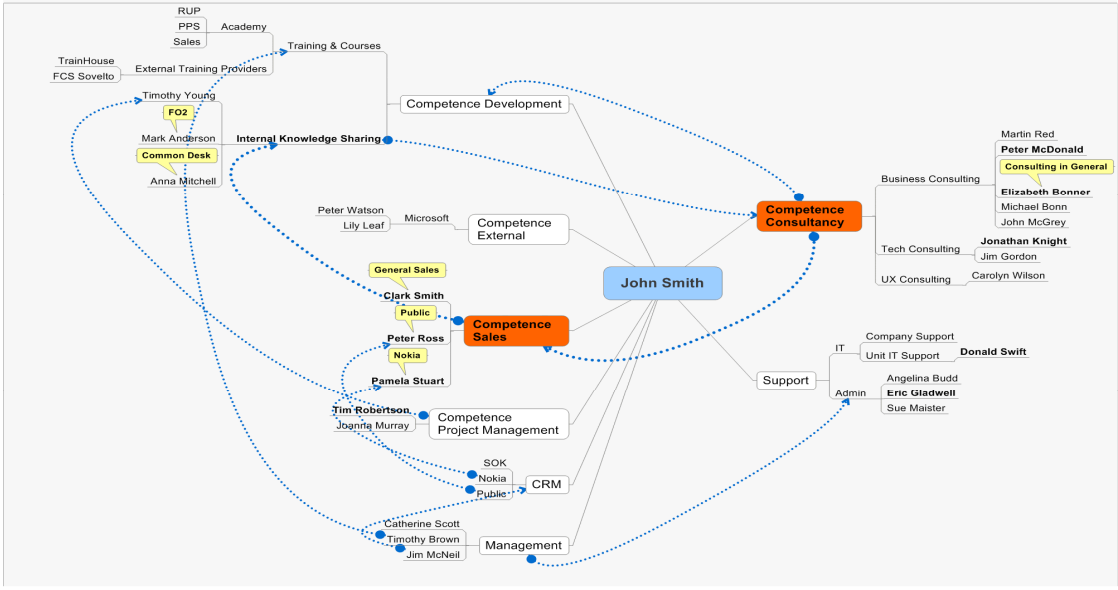


Figure 2 Example of a social network map.

With such a map it's rather easy to communicate and understand knowledge of work-related social network. This knowledge usually remains hidden for most parts because communicating it without a tool would take a long time and only partly be understood. So this knowledge that is implicitly in experienced people remains hidden because people generally don't ask for a full description.

This tool should be prepared by the person introducing the newcomer either together with him, explaining the people network, or together with other colleagues before the newcomer has arrived. After creation, responsibility for updating the map will be transferred to the new colleague.

Some guidelines for map creation:

- Who are the people you need to know?
  - Embolden the more significant people for your work.
  - Who are the ones you need to meet first?
- What are the relationships between people?
  - Who influence each other? How are they connected?
- What are the most relevant topics – what should you talk about with each person?
- What are their roles regarding your work?
- You might want to add the persons' images from Focus.

Now that there's **an empowered way to navigate the social network**, then what.. Where's the tacit knowledge you're talking about? Well, the network is a tool for gathering tacit knowledge through natural means and understanding the network will help you interact with people you need to and also on most of the most relevant stuff.

2. Personal role map

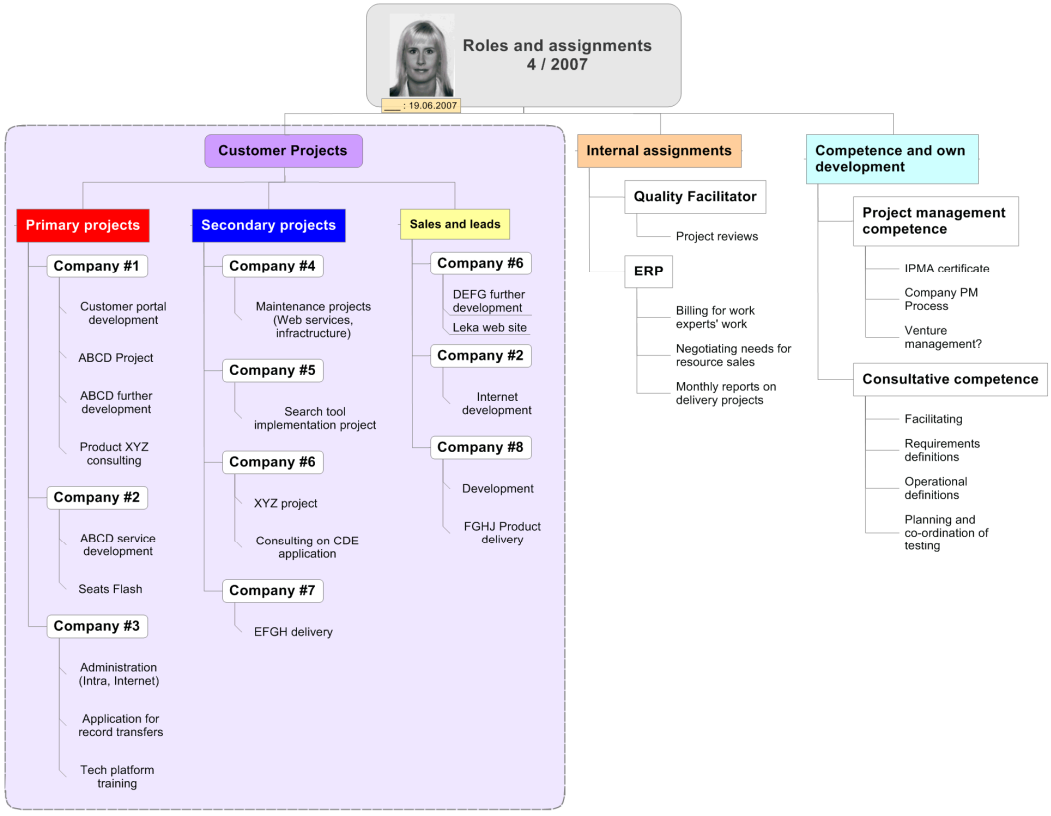


Figure 3 Example of a personal Role map.

The role title gives only a superficial understanding of the professional actions and responsibilities of the new employee. There are also role expectations that come "between the lines" like personal competence development. The personal role map provides a way to communicate the contents of work and what is indirectly related to work in a concrete and comprehensive way. This enables the employee and his supervisor to have a tool for negotiating shared understanding about the actual content and quantity of work.

Guidelines for building a personal role map:

- In the context of your role in the company, what are your responsibilities?
- What high-level actions are you expected to take in these contexts?
- What are you internal tasks, what are you external tasks?
- What other things do you need to be doing in the context of your role, that are not directly related to it?
- Is there something you have "grown into" doing that indirectly benefits the company? (for example mentoring some new employees)
- Does your role map accurately represent the areas where you use of your time?

3. Conversational tacit knowledge sharing perspectives

Sharing tacit knowledge with this tool, in a conversation, will bring up things that may not be perceived as significant, that you may not happen to think of. Most often these things are very significant, especially to a new person on the job.

Example: How do you get an expert in sales (for example) to tell you what he does in a way that is both rather complete and also specific enough so that it is easy to understand? "I sell these products to clients X and Y" will not really broaden your picture.

We generally assume we know what a person does. "You're a salesperson, right?" - "Yes". We might imagine that a salesperson sells and that there is not much more to it. However, already assuming that we know will tell us little about the true understanding a person has. If we were to ask an unassuming question like "As a salesperson, what is it actually that you do?" we will most likely get a much richer answer like "I help our customers in finding solutions". Well, that's the job of a salesperson, right.. Still, how many new salespersons understand it that way?

Here is a tool for getting a broad enough perspective that understanding becomes rather full, and much of the tacit knowledge that a person holds implicitly will be articulated as well. The tool consists of "asking the right questions", or, more likely, of managing enough perspectives.

Questions like these can **reveal the mental model** of how a person perceives the work that he's doing. The person who perceives his job as "helping the customer find solutions" will likely do much better in managing the relationship than another one who thinks of his job as "selling" of "pushing services". By unassumingly asking the right questions we get closer to finding "the difference that makes the difference", the 2 degree shift that determines whether a golf ball will land on the green or 30 meters away.

So, I will present you a **framework for unassumingly asking the right questions** that I have very good experience about.

Usually when you start to ask broad and unassuming questions like "Why do you do this work the way you do?" it tends to get the other person a little irritated at first. This is a GOOD sign! If they find the question a bit difficult to answer it means they need to gather their thoughts and most likely will find information they haven't articulated before. It’s good to explain this to the person who is asked the questions, beforehand.

First they will most likely scratch their head for a few seconds and then happens something like "opening of a dam", after which they will talk for several minutes straight and share something significant, some of which they probably haven’t articulated or considered ever before.

So, here are some of the most useful perspectives:

- **Essence.** "The work you do, what is the essence of it?" "What is it about"?
- **Environment.** "The Where" and "The When". “Please tell me about the environment my work will be in.”
- **History.** The "How did we get here." “Please tell me from the history perspective, how did we get here..? Please tell me in about 5 minutes..”
- **Behaviour.** "The What". “What does there really happen in my work?” “What are the behaviours that I need to do?” “What are the behaviours of others?”
- **Skills and abilities.** "The How". “What are the skills and abilities needed in my work?” “How, specifically do we do the behaviours you have described?”
- **Beliefs and values.** "The Why". “What is important?” “Why do we do the behaviours that we do, in the way that we do them?” “What is, particularly, of value in this context?”
- **Identity.** "The Who". “Who are we as a team, how do we perceive ourselves?” “Who are we to our customers, metaphorically speaking?” “Who are the other teams and stakeholders?” “How do the others perceive us?” “What is the essence of our customers?”
- **Larger purpose.** The "what is the broader purpose of our actions", and in a broader sense the "Why does our team exist". “What is the larger purpose and larger context of our actions?” “Why does our team exist?”

Any of these perspectives can most simply be used in the following way: ***“Please tell me about (the subject) from the (beliefs and values) perspective, “The (why)”.*** *Every time you change perspectives make sure that the person sharing his knowledge knows not only the question, but also the perspective from which it is being asked.*

It is important that these questions are asked expecting the person to actually find his answers within himself. Then you listen, sometimes for several minutes at a time. Interestingly, these are in no way limited to introducing newcomers on the job.

Note: This is a tacit-to-tacit conversational tool. That means that it will be difficult to tell others really what you’ve learned unless they were present in the situation. It’s good to make some notes etc. to get back to later, when the newcomer has already settled in and review them based on his experience. Don’t use the computer during the conversation for note taking! That would cause attention to move away from the situation. Light note taking on paper during each perspective or computer mind mapping after the session probably works best.

To give an example, on the next page there is a map of information shared in a session of using the tacit knowledge sharing perspectives. The information was shared informally during a conversation and the map was distilled afterwards based on information that surfaced during the session.


Using tacit knowledge in employee introduction
An example distilled from tacit knowledge sharing perspectives.
R. Kari Ylihärsilä. 60 min.
Map background and objectives
This map was created to summarize things that came up during tacit knowledge sharing about employee introduction by using the following perspectives. The information was shared informally during conversation and the map was distilled afterwards based on information that surfaced during the session.
The conversation itself was full of thinking pauses and incomplete, not well-formulated sentences. "Ok I told you this story.. what was the other thing you wanted to know about?". The questions were very open-ended questions and there was an atmosphere of beginning an understanding for something new.
The tools and instructions for really introducing newcomers were created to the designer's best abilities before this sharing tacit knowledge session. In this session many things came up that are significant for sharing tacit knowledge that were not written down in the instructions. Many of these things the designer had never before acknowledged or put into words, even for himself.
The original instructions have since been updated with many of the here gained insights. One that was particularly significant was about what actually happens here: that in essence this process creates trust, mindset visibility and really clarifies high-level expectations
Essence
"What is the essence of using tacit knowledge in employee introduction?"
Immediate access to knowledge that isn't stored anywhere. That is also the latest knowledge, not having the stored-away stuff.
You get knowledge that people doing the job actually use to get it done. Not how it should be done in theory, but what is their own, real, for them succesful way of doing what needs to be done.
Experiencing the creation of knowledge from a live source in front of you instead of hearing or reading about it
Introducer and introducees involvement.
Creating trust, mindset visibility and clarifying high-level expectations
Negotiating a common mindset for collaboration
Environment
"Please tell me about the environment perspective. It can be cultural, social, physical.. etc"
A comfortable and informal environment is needed for sharing tacit knwoledge, not a meeting room. The 5th floor library is a very good location.
The mental environment gets similar to story-telling evenings at the campfires.
This process is best done during the first few days, when the introducee especially has the need for settling in at the new environment.
There should be enough time allocated and about half an hour of free time afterwards as well.
Don't use the computer, that would disrupt the atmosphere since the attention would drift off the conversation. Very light note taking on paper during storytelling is probably useful.
History
"Please tell me about the history perspective. How did we end up here, where we are now?"
From the organizaations perspective..
We must see a need for dealing with tacit knowledge because I was hired. From that point, it was a rather unclear process of defining my work here. Eventually we decided on three areas of focus,one of them being employee introduction.
The areas were selected besed on where dealing with tacit knowledge was best expected to support needs of the business.
Personally..
I have a background interest in a field of subjective psychology (NLP) which really hepls me work with the subjective things involved. Some of my work has been adapting those understandings into our cultural context and language.
Behaviour
"What does there really happen when we share tacit knowledge.. in employee introduction?"
Things get distilled from the introducer's abstract know-how and understanding.. into a rather deep conversation that lets the introducee have an intuitive feel for the introducer's experiences about what is being talked about.
The experience of sharing knowledge this way impresses both parties, which really helps absorbtion of knowlegde instead of just intellectually understanding what should be done.
The know-how and knowledge "landscape" of the introducer gets much more distilled and organized than it was, before the interaction. Much of this gets communicated to the introducee as well.
An atmosphere of interest and wanting to know develops in the introducee and introducer, as well as a sense of mentorship and a feel of uncovering one's own experience and understanding the value of the introducer.
The introducee gets influenced by the situation and seeing how the introducer really needs to reach within himself to find answers to his questions.. making the knowledge shared received as valuable.. and something special.
Skills and abilities
"What are the skills and abilities needed, when using tacit knowledge in employee introduction?" "How, exactly, do we do that?"
An ability to stop.. and "be present", for both the interviewer and the interviewee is useful.. Usually this happens sort of naturally! within the process.
A skill of facilitating, or being genuinely curious while asking and really expecting to get some quality answers.. This is more like an attitude. The introducee or facilitator supports the introducer to find the answers within himself, by his curiosity and really expecting to get an answer to his questions.
An ability to create a connection, in a way.. creating trust and connection. This tends also to happen naturally within the process.
A skill of going within, concentrating to find answers from one's own experience
Values and beliefs
"Why is it valuable to use tacit knowledge in employee introduction?"
The mindset comes across.. You really get a sense about the mindset here.. And this happens much faster than in the "normal way", through long observation and experience.
Going through these perspectives creates mutual understanding of a quality that is very rare unless people have already worked long together
The mind maps distill normally fuzzy, between-the-lines things into a form that lets people share and quickly communicate common understanding.
Identity
"Who are the actors present in using tacit knowledge in employee introduction?" "Who are they, metaphorically speaking?" "How do we perceive ourselves?"
To me, the introducer is like a wise village elder, like a storyteller, sharing his wisdom in the evening by the campfire..
The introducee is like fuel, fueling the interaction by intetlly listening and anticipating to get real quality answers to these questions..
To me, the introducer is also something like the muse, inspiring an artist into his or her great work. That's because it would take much more disciplined effort and focus of the introducer to alone answer these questions without the other's presence and anticipation.
Larger purpose
"What is the broader purpose of sharing tacit knowledge in employee introduction?"
From the business perspective.. The way I see it, it helps to create alignment on organizational levels, between what is done and what is said. It helps to negotiate mindsets of people involved, to know what is expected of them. This helps create more value with less effort so the quality of work and productivity will be boosted as well.
It also challenges the introducers, because they will rethink and refocus their actions with their skills and what is valuable by simultaneously accessing their knowledge about each of these perspectives.
From the personal perspective.. This helps people know what is expected of them on really high levels. They get more aligned within, get a feeling of trust, significance and being honored and acknowledged by the organization by going through this process.

Appendix II - Companies in external benchmarking study and the interview framework

People from the following companies were interviewed:

- Nokia (3)
- TietoEnator (4)
- Bureau Veritas (3)
- Microsoft (3)

Table 10 Overview of the interview framework.

Introduction	Virtual teams	Electronic workspaces	Physical workplace arrangements	Finding right people / knowledge
Ways of working	Utilizing tacit knowledge	Good practices	How to help transfer of knowledge	What is a good tool like?
Tracking progress		How to help transfer of knowledge	How is a spontaneous meeting place created?	
Introduction (in general)	Practices for leading teams	What is a good workspace like?	How can these support work processes?	How can it help in staying up to date?
Ideal state	Ideal state	Ideal state	Ideal state	Ideal state
History	History	History	History	History
Plans for development	Plans for development	Plans for development	Plans for development	Plans for development

Appendix III - Pre-study interview questions

Overview of supporting questions:

Please tell me about the present state of sharing knowledge in the company?

- What works especially well already?
- What do we need to keep?
- What has already been done?

Where, especially, is there valuable knowledge and experience in the company?

- Where is the experience in such a form that person or group doesn't really know how to put it into words?

What would be the ideal situation of knowledge sharing?

What are bottlenecks and challenges for knowledge sharing?

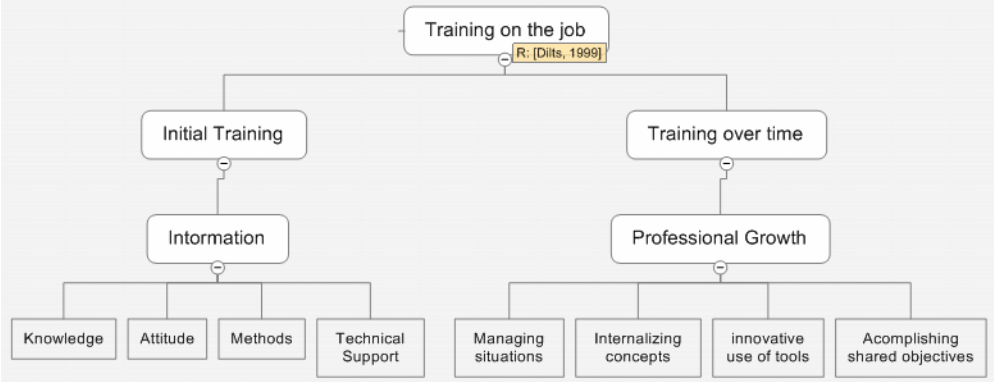
- Where do you hope for solutions?

What do you think is important about (tacit) knowledge sharing?

Appendix IV - Interview questions regarding new employee introduction

Overview of supporting questions:

- Please tell me how you have introduced this person / been introduced to the company?
- What systematics have you used (if any)?
- What have been your biggest challenges?
- When is “junior time” over?
- When does “senior time” begin?
- How do you know when the initial training turns into training on the job for professional growth?



Questions for getting details about particular tasks ([Dilts, 1999):

- Please describe a typical training situation in the context of your role while introducing a new employee?
- What are the goals or objectives that guide your actions as you are introducing a new employee in this situation?
- What do you typically use as evidence to know you are accomplishing these goals?
- What do you typically do to get the goals – what are some specific steps and activities that you use to achieve your goals in this context?
- When you experience unexpected problems or difficulties in achieving your goals in this context, what specific activities or steps do you take?

Appendix V - Interview questions regarding experience of working with virtual teams

Supporting questions:

- What are good learnings when working with virtual teams, based on your experience?
- Working with virtual teams as you understand it – what is it about?
- Please tell me about the operational environment in virtual teams.
- What are typical situations regarding virtual teams?
- What distinguishes an experienced person from a novice in virtual team context?
- What competencies are important for you (in virtual teams) as you use your resources?
- What do you do in order to make your skills and competencies available to the teams?
- What has already been done in the area of improving virtual teams' work? What is important about the team and its relationships to stakeholders in order to move in the right direction?
- What resources does the team need to fulfil its purpose well?
- What is important in the use of teams' resources?
- How should these learnings be widely adopted into use in the organization?

Appendix VI - Web-survey on using interaction technology

Quantitative questions:

1. Which of the following tools / ways of using the web have you used outside of work? Which ones have you found to be good? *(tools are listed below)*
2. TOP 3 - Which tools would you recommend for company internal use? (Some of the tools are already available to some extent. Of these, take into account those that you see that their use could be improved clearly.)

Qualitative questions:

3. In what contexts have you used the TOP 3 tools you selected?
4. Please comment, what tools and for which use do you think would hold the greatest potential in our company?
5. Please take a minute for creating ideas on what means should be used to bring the tools that you find good, widely into use in our company?

Table 11 Survey results on experience about using electronic interaction tools outside the organization *(question 1).*

2. Which of the following tools / ways of using the web have you used outside of work? Which ones have you found to be good?

	I have found this to be good	No particular opinion	This is not for me	Haven't used	Response Average
Chats	**52% (31)**	13% (8)	20% (12)	15% (9)	**1.63**
Instant messaging (Windows messenger, skype, Office communicator etc.)	**92% (54)**	0% (0)	2% (1)	7% (4)	**1.04**
Community memberships (Social group portals, common interest - membership sites)	**43% (25)**	12% (7)	10% (6)	34% (20)	**1.50**
Personal social sites (Myspace etc.), visited	**40% (24)**	7% (4)	27% (16)	27% (16)	**1.82**
Personal social sites (Myspace etc.), created own site	17% (10)	5% (3)	18% (11)	**60% (36)**	**2.04**
Videoservices (Youtube etc), used	**87% (52)**	7% (4)	3% (2)	3% (2)	**1.14**
Videoservices (Youtube etc), contributed to	7% (4)	8% (5)	19% (11)	**66% (39)**	**2.35**
Auction sites (eBay, Huuto.net etc)	**61% (36)**	10% (6)	3% (2)	25% (15)	**1.23**
Videocalls / VoIP calls (Skype etc)	**60% (36)**	15% (9)	12% (7)	13% (8)	**1.44**
IRC	23% (14)	17% (10)	28% (17)	**32% (19)**	**2.07**
Virtual worlds (Second life etc)	12% (7)	15% (9)	23% (14)	**50% (30)**	**2.23**
Social networking services (LinkedIn etc)	**35% (21)**	27% (16)	17% (10)	22% (13)	**1.77**
Creating knowledge without centralized ownership (Wiki etc)	**67% (40)**	8% (5)	7% (4)	18% (11)	**1.27**
Blogs, reading	**72% (43)**	13% (8)	10% (6)	5% (3)	**1.35**
Blogs, writing (blogging)	28% (16)	5% (3)	16% (9)	**52% (30)**	**1.75**
Collectively organized information (Del.icio.us, Panoramaio etc), used sites	28% (17)	13% (8)	3% (2)	**55% (33)**	**1.44**
Collectively organized information (Del.icio.us, Panoramaio etc), contributed to	9% (5)	14% (8)	5% (3)	**72% (42)**	**1.88**
Social encyplopedias (Wikipedia etc), used	**95% (57)**	3% (2)	0% (0)	2% (1)	**1.03**
Social encyplopedias (Wikipedia etc), contributed to	14% (8)	10% (6)	10% (6)	**66% (39)**	**1.90**
Knowledge views or "Lenses" bringing together knowledge from the Internet around different subjects by enthusiasts on topics (Squidoo etc)	17% (10)	14% (8)	7% (4)	**62% (36)**	**1.73**
				Total Respondents	**60**
				(skipped this question)	0

Table 12 Survey results on interaction tools recommended for use within the organization *(question 2)*.

4. TOP 3 - What would you recommend for company internal use? (Some of the tools are already available to some extent. Of these, take into account those that you see their use could be improved clearly).

	Response Percent	Response Total
Chats	6.8%	4
Instant messaging (Windows messenger, skype, Office communicator etc.)	**61%**	**36**
Community memberships (Social group portals, common interest - membership sites)	15.3%	9
Personal social sites (Myspace etc.), visited	10.2%	6
Personal social sites (Myspace etc.), created own site	5.1%	3
Videoservices (Youtube etc), used	22%	13
Videoservices (Youtube etc), contributed to	10.2%	6
Auction sites (eBay, Huuto.net etc)	1.7%	1
Videocalls / VoIP calls (Skype etc)	35.6%	21
IRC	3.4%	2
Virtual worlds (Second life etc)	3.4%	2
Social networking services (LinkedIn etc)	20.3%	12
Creating knowledge without centralized ownership (Wiki etc)	49.2%	29
Blogs, reading	30.5%	18
Blogs, writing (blogging)	30.5%	18
Collectively organized information (Del.icio.us, Panoramaio etc), used sites	18.6%	11
Collectively organized information (Del.icio.us, Panoramaio etc), contributed to	8.5%	5
Social encyplopedias (Wikipedia etc), used	35.6%	21
Social encyplopedias (Wikipedia etc), contributed to	20.3%	12
Knowledge views ot "Lenses" bringing together knowledge from the Internet around different subjects by enthusiasts on topics (Squidoo etc)	6.8%	4
View Other (what)	3.4%	2
Total Respondents		**59**
(skipped this question)		1